Environmental Technology and Service Opportunities in the Baja California Peninsula

California Environmental Protection Agency

Cal/EPA International Affairs Unit

Environmental Technology and Service Opportunities in the Baja California Peninsula

January 2003

Cal/EPA International Affairs Unit

Prepared By:

Institute for Regional Studies of the Californias
San Diego State University

California Environmental Protection Agency

Winston H. Hickox, Secretary

Nancy H. Sutley
Deputy Secretary for Policy and Intergovernmental Relations

Ricardo Martínez García
Assistant Secretary for International Affairs

California Environmental Protection Agency - International Affairs Unit
1001 I Street, Sacramento California 95814 (916) 445-3846

Environmental Technology and Service Opportunities
in the
Baja California Peninsula

This project is the result of collaboration by many individuals and organizations.

Project Team

Milena Bertram
Denise Moreno Ducheny
Paul Ganster
Bertha Hernández
Elena Lelea
Jasmin Manipud
Kenn Morris
Christiane Müller-Rostin
Joel Pilco
Angélica Villegas

Collaborating Organizations

California-Mexico Trade Assistance Centers
California Technology, Trade, and Commerce Agency
Canacintra Tecate
Canacintra Tijuana
Comisión Estatal de Servicios Públicos de Tecate
Industrial Environmental Association
Southwest Center for Environmental Research and Policy
Southwestern College's Small Business Development and International Trade Center

Support

This project was realized with the support of

the Cal/EPA International Affairs Unit.

Winston H. Hickox
Agency Secretary,
Cal/EPA

State of California
California Environmental Protection Agency

Gray Davis
Governor

Dear Reader:

Over the past decade, Mexico has realized unprecedented economic expansion. Because of its proximity to the United States, Mexico's northern border region has seen a proportionately larger share of economic growth than the rest of the country. Unfortunately, the recent development has also resulted in environmental degradation of soil, water, and air. Similar economic expansion and environmental degradation has occurred in the southwestern United States.

Because of the commitments of both governments, numerous national and international environmental protection programs and initiatives have been implemented in the region. In the State of California, Governor Gray Davis has made the improvement of our relationship with Mexico a keystone of his administration. Before being inaugurated into office, Governor-elect Davis traveled to Mexico City to meet with Mexican President Ernesto Zedillo. After the election of a new Mexican President, Governor Davis has had meetings with President Vicente Fox on a regular basis both in California and in Mexico.

Both leaders have recognized that the protection of the environment is a key component of maintaining and strengthening our close economic relationship. The California Environmental Protection Agency (Cal/EPA) established the Border Environmental Program within the Office of the Secretary on July 1, 2000. In March 2001, the administrations of President Fox and Governor Davis participated in the enactment of agreements to protect the environment in the Border Region. President Fox has responded to the environmental challenges in the Border Region by strengthening enforcement of Mexican Environmental Laws and by appointing a special envoy to the Baja California – California region to oversee the expansion and implementation of environmental programs.

The Mexican States of Baja California and Baja California Sur have and will continue to experience major industrial and economic growth. Several cities in the region, such as Tijuana, are expected to double the size of their populations within the next 18 years. The governments of the United States, Mexico, California, Baja California and Baja California Sur are committed to maintaining the infrastructure necessary to protect their environments during this period of growth. Several National and International Monetary funds are pursuing environmental infrastructure improvement funding opportunities in the region. Additionally, the funding of improvements by the private industry is being multiplied by the Mexican government's acceptability of privatizing some local or municipal services, such as water treatment and solid waste collection, that have, in the past, been the exclusive purview of Mexican Government Agencies.

California has much to gain from a strong and respectful relationship with Mexico. California leads the nation, if not the world, in various industries ranging from agriculture to biotechnology to environmental technologies and there is a proven need for our products and services in Mexico. The California Environmental Protection Agency remains committed to working with environmental technology and service industries to open doors for the vast opportunities waiting in the Baja California Peninsula.

Ricardo Martinez García
Assistant Secretary for International Affairs
California Environmental Protection Agency

1001 I Street | Sacramento, CA 95814
phone: 916.445.3846 | fax: 916.445.6401
www.calepa.ca.gov

Institute for Regional Studies of the Californias
San Diego State University
5500 Campanile Drive
San Diego, CA 92182-4403
TEL: 619 – 594-5423
FAX: 619 – 594 – 5474
E-mail: irsc@mailsdsu.edu

Introduction

In the wake of increasing population growth, urbanization, and economic activity, environmental conditions in the U.S.-Mexican border region have continued deteriorating at a rate that outpaces the ability of the region's policymakers to adequately respond to demands for infrastructure and services.

As a consequence, the region possesses enormous market potential for suppliers of environmental technology and services. Yet, despite the attention paid to the U.S.-Mexican border environment during negotiations for the North American Free Trade Agreement, the focus on Mexico as a market for environmental technology and services has shifted to Asia. The "Environmental Technology and Service Opportunities in the Baja California Peninsula" project seeks to renew interest in the Mexican market, particularly in the states of Baja California and Baja California Sur, where environmental quality impacts conditions in California and provide business opportunities for California companies through research and outreach.

This report is the culmination of the aforementioned research and outreach project, which involved several components, including a survey of California companies, interviews with representatives from Mexican agencies, and research using printed and original sources. The project team studied market potential, identified private and public financing options, sought project leads, and presented findings in a draft report that was released at a forum on April 26, 2002. The forum brought together a diverse group with representatives from California companies, Mexican government agencies at the city, state, and federal levels, Mexican companies, and other interested individuals. Participants were given an opportunity to provide their input with regard to networking, financing, and export promotion policies that would improve environmental conditions in the Baja California peninsula while also providing environmental and economic benefits to Californians. In addition to the forum, a trade show was held for California companies to display information about their products and services and a field trip was organized for participants to become more familiar with the Californian-Baja Californian border region including the cities Tijuana, Tecate, and Mexicali.

It is hoped that this document supports increased trade and sustainability in the region.

Paul Ganster, Ph.D.
Director, IRSC
Chair, Border Trade Alliance
Environment Committee

Denise Moreno Ducheny
SDSU Presidential Fellow
Member of Cal/BECC
California State Senator

Executive Summary

The contents of this report are derived from secondary sources, interviews with government officials in Mexico and the United States, surveys of industry representatives and environmental technology and service (ETS) company employees, and other international trade experts.

Chapter I defines the ETS sector as products and services that involve pollution control, waste management, site remediation, environmental monitoring, and recycling. The ETS market in Mexico is expected to continue to grow at an annual rate of 7 percent during the 2002–2006 period. U.S. vendors dominate as suppliers to the Mexican market. Mexico is decentralizing its environmental authority and developing new legislation and regulations at the municipal and state level. Although Mexico's economy has been affected by the recession in the United States, the peso's purchasing power remains strong.

Chapter II identifies water pollution control and treatment issues in the arid Baja California and Baja California Sur region. As SEMARNAT implements its National Hydraulic Program for 2001–2006, opportunities for supplying equipment and services will increase for infrastructure development, prevention and treatment of water pollution, and water conservation. Mexican authorities are seeking to increase coverage of households with potable water services and access to sewerage facilities in Tijuana, Mexicali, Tecate, and other parts of the peninsula.

Chapter III discusses air quality management issues related to point and nonpoint source pollution in the Baja California peninsula. Pilot programs for reducing vehicle-related air pollution are in initial stages in Tijuana. Opportunities will increase as Mexico expands its monitoring capabilities and enforcement capacity.

Chapter IV explores energy efficiency and renewable energy opportunities in the Baja California peninsula. Liberalization of regulations for Mexico's electric

power industry has begun, leading to increased private investment in power generation facilities. Other plans are under way to increase natural gas transmission to and within Baja California. Renewable energy sources are only a small part of Mexico's energy portfolio, but opportunities for increasing energy efficiency are gaining greater attention.

Chapter V describes trends in industrial environmental management, including Mexican programs to increase energy conservation and efficiency. Environmental management systems and ISO 14001 certification are still in the early stages of acceptance by companies in Mexico and the need for accredited environmental auditors is growing as enforcement increases and more emphasis is placed on voluntarily reducing environmental impacts.

Chapter VI identifies problems related to solid waste management. The market for municipal and industrial solid waste management equipment and services is one of the least developed environmental market segments in Mexico. NADBank, Banobras, and municipal organizations are working together to increase the availability of infrastructure.

Chapter VII highlights issues dealing with hazardous waste management in the peninsula, where a shortage of disposal and confinement facilities exists. The market for remediation of contaminated soil is also incipient.

Chapter VIII describes agriculture in the peninsula as an economic sector and as a factor in environmental management. Specific programs of interest to California companies include agricultural water conservation and agricultural drainage waste management.

Chapter IX provides an overview of finance opportunities for organizations purchasing and/or selling ETS products in Mexico.

The final chapter (Chapter X) presents the results and recommendations of the research conducted for this report. The information in this chapter is based on the previous nine chapters, feedback from readers of the draft report, and presentations at the forum at the Hotel Camino Real in Tijuana on April 26, 2002.

Table of Contents

Table of Contents (cont)

Table of Contents (cont)

List of Acronyms and Abbreviations

BANOBRAS	Banco Nacional de Obras y Servicios Públicos (National Bank for Public Works and Services)
BAR	California Bureau of Automotive Repair
BDC	Business Development Corporation
BECC	Border Environment Cooperation Commission
Cal/EPA	California Environmental Protection Agency
CARB	California Air Resources Board
CESPE	Comisión Estatal de Servicios Públicos de Ensenada (State Public Services Commission of Ensenada)
CESPT	Comisión Estatal de Servicios Públicos de Tijuana (State Public Services Commission of Tijuana)
CESPTE	Comisión Estatal de Servicios Públicos de Tecate (State Public Services Commission of Tecate)
CFE	Comisión Federal de Electricidad (Federal Electricity Commission)
CIMARI	Centro Integral de Manejo y Aprovechamiento de Residuos Industriales (Integrated Centers for the Management and Utilization of Industrial Wastes)
CNA	Comisión Nacional del Agua (National Water Commission)
CNANF	Comisión Nacional de Áreas Naturales Protegidas (National Commission for Protected Natural Areas)
CNF	Comisión Nacional Forestal (National Forest Commission)
CONAE	Comisión Nacional para el Ahorro de Energía (National Commission for Energy Savings)
CRE	Comisión Reguladora de Energía (Energy Regulatory Commission)

List of Acronyms and Abbreviations (cont)

DGE	Dirección General de Ecología (General Directorate of Ecology)
EPA	U.S. Environmental Protection Agency
EWCP	Export Working Capital Program
Ex-Im Bank	Export-Import Bank of the United States
FIDE	Fideicomiso para el Ahorro de Energía Eléctrica (Trust Fund for Electric Energy Savings)
FINFRA	Fondo de Inversión en Infraestructura (Infrastructure Investment Fund)
FIPREV	Fondo para Proyectos de Prevención de la Contaminación (Pollution Prevention Projects Fund)
FUNTEC	Fundación Mexicana para la Inversión en la Pequeña y Mediana Empresa (Mexican Foundation for Investment in Small- and Medium-Sized Companies)
IADB	Inter-American Development Bank
IBRD	International Bank for Reconstruction and Development
IBWC	International Boundary and Water Commission
IDA	International Development Association
IFC	International Finance Corporation
IIE	Instituto de Investigaciones Eléctricas (Institute for Electrical Research)
INE	Instituto Nacional de Ecología (National Environmental Institute)
IPP	International Power Producer
ITT	Instituto Tecnológico de Tijuana (Technological Institute of Tijuana)
IWTP	International Wastewater Treatment Plant
JBIC	Japanese Bank for International Cooperation

List of Acronyms and Abbreviations (cont)

LGEEPA	Ley General del Equilibrio Ecológico y la Protección al Ambiente (General Law for Ecological Balance and Environmental Protection)
LNG	Liquefied Natural Gas
MIF	Multilateral Investment Fund
MIGA	Multilateral Investment Guarantee Agency
MREP	Mexico Renewable Energy Program
NAFINSA	Nacional Financiera, S.A. (National Finance Agency)
NAFTA	North American Free Trade Agreement
NOMs	Normas Oficiales Mexicanas (Mexical Official Norms)
OECD	Organization for Economic Cooperation and Development
OPIC	Overseas Private Investment Corporation
PAESE	Programa de Ahorro de Energía del Sector Eléctrico (Energy Conservation Program for the Electric Sector)
PEFCO	Private Export Funding Corporation
PEMEX	Petróleos Mexicanos (Mexican Petroleum)
PNH	Programa Nacional Hidráulico (National Hydraulic Program)
PNMARN	Programa Nacional de Medio Ambiente y Recursos Naturales 2001–2006 (National Program for the Environment and Natural Resources)
PROFEPA	Procuraduría Federal de Protección al Ambiente (Federal Attorney General for Environmental Protection)
SAGARPA	Secretaría de Agricultura, Ganadería Rural, Pesca y Alimentación (Secretariat for Agriculture, Cattle, Fisheries, and Food)
SBA	U.S. Small Business Administration

List of Acronyms and Abbreviations (cont)

SCT	Secretaría de Comunicaciones y Transportes (Secretariat of Communications and Transportation)
SEFOA	Secretaría de Fomento Agropecuario (Secretariat for the Development of Agriculture and Fishing)
SEMARNAT	Secretaría de Medio Ambiente y Recursos Naturales (Secretariat for the Environment and Natural Resources)
SENER	Secretaría de Energía (Secretariat of Energy)
SOFOL	Sociedad Financiera de Objetos Limitados (Financial Partnership for Limited Objects)
SWEP	Solid Waste Environment Program
SWPD	Solid Waste Project Development Program

Chapter I

Overview of the Mexican Environmental Market and Environmental Policy Trends in the Mexican Government

This section provides an overview of the Environmental Technology and Services Sector in Mexico as well as the Baja California peninsula. It also discusses the current state of the Mexican economy and recent trends in Mexican environmental policy with regard to regulations and enforcement.

Environmental Technology and Services Sector

Definition

As defined by the U.S. International Trade Administration (ITA), the environmental technology sector is comprised of products and services that involve:

- Pollution control in air, water, and soil
- Solid/hazardous waste management
- Site remediation
- Environmental monitoring and recycling

Included are products and services that perform one of four functions: (1) they monitor and measure the condition of the environment; (2) they help reduce or prevent pollution during a process; (3) they treat hazardous substances at the end of a process in order to control pollution; and/or (4) they restore and remediate polluted sites.

Market Data

According to the ITA, environmental technology (ET) is among the most rapidly growing sectors in the world.[1] In 2001, the global market was an estimated US$500 billion and was projected to grow to US$545 billion by the

year 2004. In Mexico, the second top ET export market for the United States behind Canada,[2] the ET sector grew at an average annual rate of 4 percent between 1997 and 2001. It is expected to continue growing at an annual rate of 7 percent during the 2002–2006 period. Experts estimate that the market size, including the water segment, is valued at US$10 billion.[3] At the end of 2001, 72 percent of Mexican imports in the ET sector came from U.S. vendors. Additional data for environmental market segments are displayed in Figures 1 and 2.

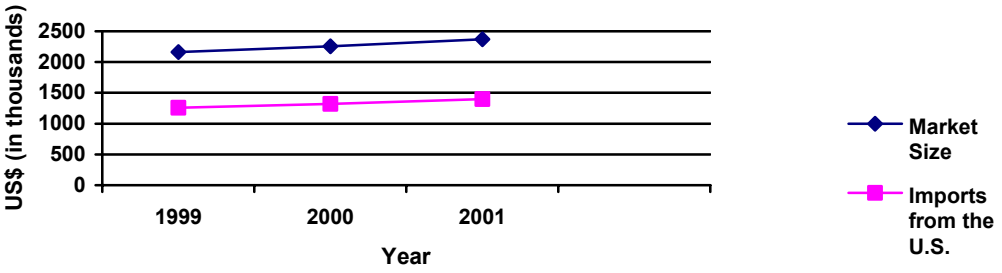

Figure 1: Market Trends for Water Resources Equipment and Services Demand in Mexico[4]

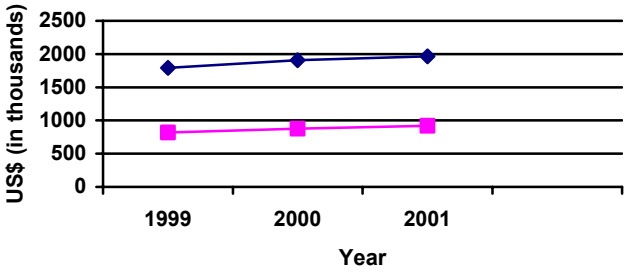

Figure 2: Market Trends for Pollution Control Equipment and Services Demand in Mexico[5]

Overview of the Baja California Peninsula

The Baja California peninsula is a dynamic region in Mexico. Its geographic proximity to the United States and its isolation from Mexico City have contributed to strong regional ties with California and Arizona. The implementation of the North American Free Trade Agreement (NAFTA) has deepened relations even further and contributed to an increase in the peninsula's importation of U.S. goods. In 1999, U.S. goods comprised 84 percent of Baja California's total import market. This figure indicates an increase in U.S. exports to Baja California by 15 percent since the implementation of NAFTA.[6]

Baja California

The northern half of the peninsula relies heavily on industry and international trade for its economic activities. Its population of approximately 3.5 million is concentrated near the Mexican-U.S. border and continues to increase at an annual growth rate of about 4 percent.[7] Nearly 95 percent of the population lives in the municipalities of Tijuana, Mexicali, and Ensenada. The remainder lives in the smaller municipalities of Tecate and Playas de Rosarito.

Baja California's economy is heavily dominated by the *maquiladora* industry, which constitutes about 22 percent of its gross regional product (GRP) and employs the largest number of people. Growth in the *maquiladora* industry averaged 6 percent per year over the 1996–2001 period, but economic slowing in the United States and the implementation of NAFTA's Article 303 have reduced this growth in 2002. Over 90 percent of expansion in recent years has been in the electronics sector, particularly in the production of television and computer monitors in addition to other electronic components.[8] Other important economic sectors in Baja California include wood products manufacturing, services such as tourism (about 20 percent of state GRP), fishing and canning, agriculture (about 1.5 percent), and mining (about 0.5 percent).

Thus, some of the best environmental export opportunities in the northern half of the peninsula include products related to water infrastructure development, industrial environmental management, air pollution equipment, and

other products that help mitigate the negative environmental impacts of rapid, unplanned population and urban growth in most of the state.

Baja California Sur

In contrast to its northern neighbor, the state of Baja California Sur relies less on industry for its sustenance. Its significantly smaller population of 450,000 people is located primarily at the southern tip of the peninsula and its economy is focused on tourism. As a result, commercial prospects are mostly found in tourism-related products, construction, marina products, and consumer goods.[9] In addition to ecotourism, other environmental export opportunities in Baja California Sur include water desalinization products and services as well as photovoltaic energy equipment.

Mexico's Economy

Mexico's economy grew at a negative rate of 0.3 percent in 2001.[10] Because economists attribute this recession to Mexico's interdependence with the United States rather than domestic factors, Mexico's economy is expected to recover in 2002 as the United States recovers from its recession. Economists predict that GDP growth will increase to 1.5 percent in 2002. Meanwhile, the industrial sector decreased by 3.5 percent in 2001 due to reduced demand from the United States and a strong Mexican peso. The peso's strength has increased Mexican consumer purchasing power and stimulated foreign direct investment, a trend that is expected to continue thru this year. Nevertheless, economists expect the peso to decline, although the peso has defied expectations in the past few years and continued to increase in value relative the U.S. dollar. An increase in purchasing power could be beneficial to U.S. exporters as importers are better able to afford U.S. products.

Environmental Investments in Mexico and the Fox Administration

In a recent public statement, Víctor Lichtinger, Mexico's environmental minister, declared that it would take at least 20 years to restore the damage created by decades of neglect to Mexico's natural resources and to approach

sustainability.[11] His statement highlights a gradual change in attitude toward the environment that has emerged in Mexico over the past decades. Increased attention to environmental conditions and the related shortage in environmental infrastructure, such as wastewater treatment facilities and solid waste disposal sites, is generating a number of new projects that will be financed over the next five years through the collaboration of agencies and banks at several levels—including federal, state, local, domestic, and multinational development banks.[12] Mexico's environmental agency, the Secretariat for the Environment and Natural Resources (Secretaría de Medio Ambiente y Recursos Naturales–SEMARNAT), has a total budget of US$1.4 billion for 2002.

Environmental Legislation and Federal Agencies

The cornerstone of environmental legislation in Mexico is the General Law of Ecological Balance and Environmental Protection (Ley General de Equilibrio Ecológico y Protección Ambiental–LGEEPA). Originally passed in 1988, it was modified in 1996. The LGEEPA addressed air, water, noise, and soil pollution, as well as the management of hazardous wastes, hazardous materials, and nuclear energy. The LGEEPA remains the principal legal instrument used for environmental enforcement today, but has included some revisions and is supported by a series of official standards known as the Mexican Official Norms (Normas Oficiales Mexicanas–NOMs).

Over the past three decades, environmental responsibilities at the federal level have been shifted among agencies depending on whether the environment was treated as a health or economic development issue. Under the Zedillo administration (1994–2000), the first cabinet-level environmental agency, known as the Secretariat of Environment, Natural Resources, and Fisheries (Secretaría de Medio Ambiente, Recursos Naturales y Pesca–SEMARNAP), was established to foster more cohesive environmental policies.[13] The Fox administration has continued the goal of integration by requiring interaction among subagencies in developing strategic plans and setting coordinated objectives when planning programs and policies. In addition to moving oversight of fishing to the

agricultural agency, which led to renaming the environmental agency the Secretariat of Environment and Natural Resources (Secretaría de Medio Ambiente y Recursos Naturales–SEMARNAT), the Fox administration also created an independent forestry agency (CNF) and is renewing emphasis on national water resources.

Decentralization

The Fox administration's National Development Plan (Plan Nacional de Desarrollo 2001–2006) further strengthens federalism in Mexico by establishing a commitment to redistribute income and decentralize responsibilities.[14] Through the process of decentralization, state environmental agencies and new municipal environmental agencies have been created. Along with these new institutions, states and municipalities in the Baja California peninsula have developed local environmental standards and legislation. As states and municipalities increase their capacity to deal with environmental policy and enforcement, the trend toward decentralization will continue with the transfer of increased resources to states and municipalities. As this happens, in future years, with state and municipal environmental agencies more actively enforcing their laws, this will stimulate growth in markets for environmental technologies and services in the peninsula.

State Agencies

State agencies in Baja California and Baja California Sur currently have a number of responsibilities for monitoring the environment. The General Directorate of Ecology (Dirección General de Ecología–DGE) of Baja California is responsible for granting industrial permits to operate plants in the state. In Baja California Sur, the state carries out environmental responsibilities through the Directorate of Urban Planning and Ecology (Dirección de Planeación Urbana y Ecología). The State Commission of Public Services (Comisión Estatal de Servicios Públicos) has offices in each of Baja California's municipalities except Playas de Rosarito, which is represented by a district office at CESPT in Tijuana.

The State Commission offices are responsible for household wastewater treatment as well as supplying potable water to the local populations. Under the Fox administration's efforts to decentralize environmental responsibilities, the state DGE and CESPT may soon have greater authority, but effective action will depend on the amount of financial resources and capacity building provided by the federal government.

Municipal Agencies

The Fox administration is furthering the decentralization efforts of environmental management by increasing municipalities' abilities to raise funds through the issuance of bonds for infrastructure and to develop their own regulations. In 2001, the Municipality of Tijuana established municipal environmental regulations through consultations with a multi-sector task force including municipal officials, community members, environmental attorneys, and representatives from nongovernmental organizations (NGOs), such as the Proyecto Fronterizo de Educación Ambiental (Border Project for Environmental Education).[15] With further development of the smog check program, Tijuana municipal agencies will be responsible for monitoring vehicle emission levels and issuing permits. Ensenada has had a municipal environmental agency for some time now.

Cross-Border Environmental Management

Since the 1980s, Mexican and U.S. officials have been increasing collaboration on environmental problems that have transborder effects. Acknowledging that pollution does not recognize political borders, the U.S. and Mexican federal governments signed the Agreement on Cooperation for the Protection and Improvement of the Environment in the Border Area (commonly known as the La Paz Agreement) in 1983. Based on this precedent, the U.S. and Mexican governments developed the Integrated Environmental Plan for the Mexican-U.S. Border Area (IBEP) in 1992, which later evolved into the Border XXI Program in 1996.[16] Through these agreements, federal and state agencies

met and established working relationships with their counterparts across the border. U.S. and Mexican government officials, beginning with the La Paz Agreement, developed working groups by environmental media to enhance cross-border technology transfer, training, and collaboration on enforcement issues. Upon reaching a sunset phase in 2001, the Border XXI Program is being reevaluated, although working relationships continue. The next iteration of the program, due to be implemented early in 2003, will have a more regional focus rather than a borderwide approach and will retain the specific working groups. In the future, the binational working groups will play an important role in defining environmental priorities at the regional level.

Three other mechanisms for cross-border environmental collaboration include the Border Environment Cooperation Commission (BECC), the North American Development Bank (NADBank), and the Commission for Environmental Cooperation (CEC). Although widely criticized, each has advanced the ability of the border region to begin catching up with pressing environmental concerns. The BECC certifies border infrastructure projects for financing by the NADBank and enables communities to become more involved in determining which projects are suitable for their needs. Thus, before a project can be funded by the NADBank, it must be certified by the BECC. This practice has catalyzed considerable criticism as it slows down the funding process, but has increased transparency and enabled communities to provide input into the projects that will impact their municipalities financially and in other ways. A review of BECC project submissions provides an excellent overview of local border infrastructure needs in the areas of wastewater treatment, water supply, and solid waste. In the future, the BECC and NADBank will expand beyond their original focuses on water, wastewater, and solid waste infrastructure projects to also deal with air quality and hazardous waste issues.

As will be seen in greater depth in Chapter IX, the NADBank provides loans, grants, and training for border environmental infrastructure projects. Although it has brought more financing opportunities to the border region, its

effectiveness has been constrained by the legal and regulatory context that has prevented it from lending directly to Mexican municipalities and the fact that most infrastructure projects have low rates of return and are unable to generate the income necessary to repay NADBank loans that must offer most loans at U.S. commercial rates. In 2002, discussions of the evolving role of the BECC and NADBank are still ongoing. Finally, the trinational CEC provides community groups with a mechanism to address environmental education and enforcement issues in the North American continent. The CEC has increased information exchange in a range of environmental issues, including pollution prevention, biodiversity, community right-to-know, and others. The CEC has also provided a forum for residents to submit complaints when governments do not adequately enforce their own environmental laws, although the CEC has little punitive power.

States and cities have also increased collaboration across the border in recent years. In 2000, the State of California's Environmental Protection Agency (Cal/EPA) developed a Strategic Environmental Plan with its counterpart agency in the State of Baja California, the General Directorate of Ecology (DGE). In doing so, the states formalized a working relationship that began in 1997 with information exchange workshops in which government officials from California agencies met their counterparts in Baja California and shared information about their projects and proposals. Through interagency projects, Baja California has been able to develop some new infrastructure and capacity, albeit far less than it needs to keep pace with growing demands.

Priorities of the Fox Administration and Emerging Trends

The complexity of actors, conflicting jurisdictions, and disparate legal systems makes the U.S.-Mexican border region a challenging place to do business. At the same time, the region's plethora of environmental needs provide many opportunities for investment. SEMARNAT has expressed interest in developing and implementing a national strategy for solid wastes and industrial and municipal wastewater, as well as designing industrial waste plans to

accompany the implementation of infrastructure projects.[17] Other priorities[18] during the Fox administration include:

- Reviewing environmental standards (NOMs) and revising them to facilitate compliance by small- and medium-sized companies
- Implementing programs to engage more private-sector participation in the treatment and disposal of industrial waste
- Increasing spending on environmental infrastructure in the Mexican-U.S. border region

Although progress has been slow, the coordinated demands made by the municipal and state leaders belonging to the National Action Party (Partido Acción Nacional–PAN) in office since December 2001 will help keep attention focused on border environmental infrastructure needs. Increased emphasis on legal enforcement will also require more companies to invest in equipment and services that bring them into legal compliance. Both of these tendencies will lead to an increase in opportunities for providers of environmental technology and services.

References

[1] International Trade Administration (ITA), U.S. Department of Commerce. 2002a. Industry Facts: Environmental Technologies Industries." (Cited 21 April), http://infoserv2.ita.doc.gov/ete/e…8ac6d85256883006c452c?OpenDocument.
[2] International Trade Administration (ITA), U.S. Department of Commerce. 2002b. "Trade Statistics for Environmental Products." (Cited 21 April), http://infoserv2.ita.doc.gov/ete/eteinfo.nsf/…l
[3] International Trade Administration (ITA), U.S. Department of Commerce. 2002c. "Environmental and Water Resources Sector." *Market Research Reports: International Market Insight Reports.* Washington, D.C.: International Trade Administration, U.S. Department of Commerce.
[4] U.S. Commercial Service. 2002. "Sector Name: Water Resources Equipment and Services." *FY 2002 Country Commercial Guide: Mexico.* (Cited 21 April), http://www.usatrade.gov/Website/ccg.nsf/CCGurl/CCG-MEXICO2002-CH--004D2695.
[5] U.S. Commercial Service. 2002. "Sector Name: Pollution Control Equipment." *FY 2002 Country Commercial Guide: Mexico.* (Cited 21 April), http://www.usatrade.gov/Website/ccg.nsf/CCGurl/CCG-MEXICO2002-CH--004D2695.
[6] U.S. Commercial Service. 2002. "Chapter 2: Economic Trends and Outlook." *FY 2002 Country Commercial Guide: Mexico.* (Cited 21 April). Washington, D.C.: U.S. & Foreign Commercial Service and the U.S. Department of State, http://www.usatrade.gov/Website/ccg.nsf/CCGurl/CCG-MEXICO2002-CH--004D2695.
[7] U.S. Commercial Service 2002.
[8] U.S. Commercial Service 2002.

[9] U.S. Commercial Service 2002.
[10] ITA, U.S. Department of Commerce 2002.
[11] *The San Diego Union-Tribune*. 2002. "Mexico Sees 20-Year Effort to Clean Up Environment." (January 17): A21.
[12] International Trade Administration (ITA), U.S. Department of Commerce 2002c.
[13] International Trade Administration (ITA), U.S. Department of Commerce. 1996.
[14] Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT). 2002. *Descentralización de la gestión ambiental.* (Cited 16 January). Mexico City, MX.
[15] Durazo, Laura. 200. Personal communication, 7 November.
[16] Ganster, Paul. 1996. *Environmental issues of the California-Baja California border region: Southwest Center for Environmental Research and Policy Border Environment Research Reports, No. 1.* San Diego, CA: Institute for Regional Studies of the Californias.
[17] ITA, U.S. Department of Commerce. 2001. "Environmental Engineering Services." (Cited 11 December), http://www.stat-usa.gov/mrd.nsf/vwIMI_Country/85ED8F8B6DECDCD…
[18] ITA, U.S. Department of Commerce. 2000. "Environmental Priorities Next Administration 2000–2006." *Market Research Reports: International Market Insight Reports.* (Cited 9 August 2001), http://www.stat-usa.gov/.

Chapter II

Water Pollution Control and Treatment

Overview

Mexico faces serious challenges in providing an adequate water supply and sufficient wastewater treatment. Although water sources are abundant in Mexico, most are located far from major population areas. Not only does 70 percent of the population live in areas where water resources are scarce (mainly in Northern and Central Mexico) but these resources have in many cases been overexploited or severely polluted. At the same time, nearly 78 percent of municipal wastewater and 85 percent of industrial wastewater is untreated when discharged into oceans, rivers, lakes, and groundwater, often negatively affecting the quality of fresh water destined for human use.

Despite the progress made in developing water infrastructure within the country, there remain regional gaps in providing citizens with potable water and adequate sewage systems. Although Mexico is second behind Chile in potable water coverage in Latin America, only 88 percent of the population has access to potable water and in rural areas this percentage is even lower. Thirty-two percent of the rural population is without clean drinking water. Another serious infrastructure problem is the inadequate sewage system. Although 76 percent of the population is connected to sewage collection systems, only 23 percent of all raw sewage is actually treated. Most of the sewage is directly released into all major water bodies without treatment.[1]

In Baja California and Baja California Sur, provision of fresh water is especially challenging, given the region's dry climatic conditions and an expanding human population. The border region obtains most of its water from the Colorado River, while the rest of the peninsula relies on wells and desalination plants, of which there are not enough. In recent years, the U.S.-Mexican border region has experienced tremendous population, urban, and industrial growth. The annual population growth rate of Baja California hovers around 4.5 percent; already there are more than 2 million people living

in close proximity to the border.[2] Industry, particularly the *maquiladora* industry, has grown rapidly, creating additional demand for water-related services. The expansion of water infrastructure has mostly lagged behind urban and industrial growth.

Not only do many people in the region lack potable water, but the sewage treatment plants in the region cannot process all the raw sewage. Tijuana's sewage plant, for example, handles a total of about 25 million gallons per day and the binational International Wastewater Treatment Plant has the capacity to treat another 25 million gallons per day.[3] However, Tijuana's urban and industrial growth will soon produce additional wastewater that will exceed the installed treatment capacity. Other rapidly growing urban areas in Baja California and Baja California Sur are frequently faced with the almost impossible task of expanding basic infrastructure at a rapid pace.

Government Policies

In Mexico, the Secretariat of Environment and Natural Resources (Secretaría de Medio Ambiente y Recursos Naturales—SEMARNAT) is responsible for developing and implementing environmental legislation. SEMARNAT has developed a six-year environmental protection program called the National Program for the Environment and Natural Resources 2001–2006 (Programa Nacional de Medio Ambiente y Recursos Naturales 2001–2006—PNMARN). This program will be carried out with the help of the National Water Commission (Comisión Nacional del Agua—CNA), the National Forest Commission (Comisión Nacional Forestal—CNF) and the National Commission for the Protection of Natural Resources (Comisión Nacional de Áreas Naturales Protegidas–CNANF), all of which are agencies within the SEMARNAT.[4]

Water pollution, the protection of natural water resources, and the improvement of water infrastructure have a high priority under the current administration. SEMARNAT created the National Hydraulic Program 2001-2006 (Programa Nacional Hidráulico 2001–2006—PNH) to deal specifically with these issues. This section focuses on goals that are most likely to result in opportunities for California companies.

SEMARNAT Policy Goals for the Year 2006 (PNH) [5]

Infrastructure Measures

- To furnish 89 percent of the general population with potable water (currently 88 percent)
- To ensure that 71 percent of the rural population has access to potable water (currently 68 percent)
- To establish functioning sewage systems that serve 78 percent of the general population (currently 76 percent)

Water Pollution and Conservation Measures

- To significantly increase the treatment of both industrial and municipal wastewater from the current 23 percent of all raw sewage to 65 percent
- To enforce all current water regulations and standards and to collect water usage fines and fees from municipalities. Currently only 7 percent of all water regulations and standards are enforced
- To conserve existing watersheds and reservoirs and to establish 13 watershed protection committees

Plans for accomplishing these measures are based on collaboration among the CNA, the National Institute of Ecology (Instituto Nacional de Ecología–INE), and other government and non-government institutions. All finance plans and actions related to these goals will be accessible to the public, which is supposed to fulfill a “watchdog” function. The SEMARNAT will also be working with a slightly increased budget and many projects will be open for bidding to the private sector. Thus, the Mexican government hopes to attract both foreign and national public and private investment to enable it to carry out all of its envisioned projects. A list of projects planned in the Baja California-Baja California Sur region can be found at the end of this chapter.

Municipal and Industrial Wastewater Treatment

Municipal wastewater infrastructure investment by private sources stopped almost completely in 1995 after the peso devaluation crisis. Since most of the projects under construction or in planning had been financed through Mexican debt under variable interest rates, the surging interest rates generated bankrupted or postponed

most of them. Although the market for private wastewater infrastructure investment has begun to recover, it will take another few years until it will be back up again to its value before the peso crisis. Efforts were made to refinance some of these projects but not much has happened so far. One of the difficulties of refinancing or financing new projects is the fact that Mexican states and municipalities cannot incur foreign debt directly. All foreign credits have to be channeled through the Central Bank of Mexico (Banco de México) or through the National Bank for Public Works and Services (Banco Nacional de Obras y Servicios Públicos, S.N.C.—BANOBRAS) before reaching the municipalities. BANOBRAS, for example, then on-lends these loans in pesos at competitive market rates to municipalities, charging them spread and transaction fees to cover the exchange fee losses. These mark-ups make the foreign low-interest loans quite a bit more expensive.[6]

In the year 2001, the Mexican government passed legislation that allows states and municipalities to act as authorized issuers of debt (bonds). This law should make it easier for states and municipalities to obtain money without having to go through BANOBRAS or the Federal Government. Up to date, Standard & Poor's has given out bond ratings for several Mexican states and cities, including Tijuana and Baja California, but not many bonds have been issued. [7]

Nearly 78 percent of municipal wastewater and eighty-five percent of industrial wastewater is returned untreated to the major water bodies. The situation is only slightly better in areas with significant tourist infrastructure and activity in the U.S.-Mexican border region. The border region is a unique case since more attention to enforcement is the norm due to the proximity of the United States and the shared water bodies and groundwater sources. In general, big companies have vastly improved their discharge treatment in response to increased enforcement by authorities. Smaller companies that generate much of the industrial wastewater are often not in compliance with discharge regulations and it is probable that increasingly they will be the target of enforcement actions.

Bajagua Plant

Currently there is a proposal under way to construct a secondary wastewater treatment plant in Tijuana to supplement the binational International Wastewater Treatment Plant (IWTP) in the Tijuana River Valley. Known as the Bajagua project, the proposed plant would take effluent from the IWTP that has been treated to the primary level and with additional treatment it would recycle water that could then be resold to *maquiladoras* and other users in Tijuana. The Bajagua project is a private effort in response to authorization by U.S. federal legislation that is not yet funded.

Additional Water and Wastewater Projects in Baja California

A number of projects are planned to deal with the shortage in wastewater treatment and supply in the Municipalities of Tijuana, Mexicali, Ensenada, and Tecate. In addition, an international border aqueduct has been proposed to transfer water from the Colorado Basin to the San Diego-Tijuana region and alternative locations and costs are being explored.

Tijuana water and wastewater projects[8]

The Japanese Bank for International Cooperation (JBIC) recently granted a substantial loan to the state of Baja California for infrastructure projects in the border region. One substantial project, which is being coordinated by the State Public Services Commission of Tijuana (Comisión Estatal de Servicios Públicos de Tijuana–CESPT), has received funds from this loan. The project consists of adding and/or increasing the capacity of approximately 1,219,528 meters of wastewater collection lines (approximately 755 miles), the construction of pump stations, the installation of sewer laterals, collectors and sub-collectors and the construction of four small, decentralized treatment/reclamation plants. Total capacity of these plants is estimated to be 665 liters/second. Work has already begun on this project and is expected to continue on through 2004. Total cost is estimated to be around US$96 million.

Two other projects are also currently under development. Both are being funded by numerous sources including the CESPT, the U.S. EPA Border Environmental Infrastructure Fund (BEIF) and the North American Development Bank (NADBank). Both projects fall under the jurisdiction of the CESPT.

Project A consists of the rehabilitation of 131,000 linear meters of lines of the sanitary sewage system with pipe diameters of 20 to 122 centimeters. The project also includes the rehabilitation of the sewer network of lateral collectors and sub-collectors for a total of 51 projects. The project was approved in 2001 and work was expected to start in the same year. Total cost is estimated to be around US$44 million.

Project B consists of the development of a water/wastewater master plan for the cities of Tijuana and Rosarito. It will analyze current water/wastewater system requirements and project future growth and demands in 5-year increments. The main objective of this project is to develop long-range plans that take Tijuana's population growth rate of nearly five percent under consideration. Work on this project began in 2001 and is expected to continue through the fall of 2002.

Mexicali water and wastewater projects[9]

Currently, there are **two projects** underway in Mexicali that are being funded by the loan from the JBIC. **Project A** consists of the construction and expansion of six wastewater treatment plants in different parts of Mexicali. Material quotations for the project should be published in the next few months and construction is projected to begin the end of 2002. **Project B** consists of the construction, rehabilitation, and expansion of four water purification plants. Two plants will be upgraded, one plant will be expanded, and an additional plant will be constructed. Again, material quotations should be published around mid-2002 and construction should start toward the end of 2002 or early in 2003.

Ensenada water and wastewater projects[10]

Money from the JBIC loan will also be used to upgrade Ensenada's wastewater collection system. Plans are to expand the sewer system through installation of collectors and subcollectors, the construction of pump stations, and the construction of a wastewater treatment plant. Material quotations were scheduled to be published in August 2002 and construction should begin toward the end of the year.

Tecate water and wastewater projects[11]

The State Commission for Public Services in Tecate (Comisión Estatal de Servicios Públicos de Tecate—CESPTE) has plans to rehabilitate and upgrade Tecate's wastewater treatment plant to produce water of sufficient quality for reuse. Material quotations were scheduled to be published in mid-2002. Work is likely to begin in September of the same year and end by mid-2003.

The International Border Aqueduct[12]

Planners in the San Diego-Tijuana region have proposed building a shared international aqueduct to deal with impending water shortages in both cities. A feasibility study for the Regional Colorado River Conveyance Aqueduct was produced by a binational group of organizations that was coordinated by the San Diego County Water Authority. Other participants in the study included: the International Boundary and Water Commission (IBWC), California State Department of Resources, Comisión Nacional del Agua, and Comisión Estatal del Agua. The study, completed in April 2002, evaluated alternative routes and cost-effectiveness. The proposed project would be approximately 100 miles long and the United States and Mexico would divide costs based on shared capacity.[13] Despite support from municipal leaders, the controversial project faces opposition from the Imperial Irrigation District Board of Directors[14] and others for political, environmental, and financial reasons. The project is currently in deliberations by water and infrastructure authorities on each side of the border, pending a binational agreement.

Desalination Plants

Baja California and Baja California Sur have a scarcity of fresh water due to dry climatic conditions. Other than the Colorado River, the peninsula obtains most of its water from wells and from some desalination plants. Estimates predict that there is only enough fresh water available for Baja California Sur for the next five years to meet the growing tourism industry that already has around 8,000 hotel beds. However, Baja California Sur is a popular tourist region that is experiencing rapid growth in the tourism sector and it plans to expand its hotel bed capacity substantially. Currently there are only 11 government owned desalination plants in the entire Baja California peninsula,

not nearly enough to furnish the population with potable water once groundwater resources are depleted. Many hotels under construction opt for building their own desalination plants, which means good prospects for potential investors. Since fresh water is scarce, many tourist facilities have established or will establish water reclamation and reuse facilities for landscaping and golf courses.[15]

Baja California authorities have also proposed the construction of a large desalination plant in the Tijuana region as an alternative or supplement to the international aqueduct. However, for Tijuana and other areas of the peninsula, the high cost of desalination is problematic. The state government also has plans to build other desalination plants, although no concrete projects are under construction.[16]

Best Market Prospects

Baja California

Because of its geographic location, Baja California has a tradition of looking to the United States for technology, supplies, and equipment. Baja California offers very good market prospects for those companies interested in investing in the fields of wastewater treatment (both industrial and municipal), infrastructure expansion and management (construction of potable water and sewage systems), and water desalination plants (both in construction and managing). There is a strong demand for equipment and technology in these areas due to the expansion of the tourism industry in Baja California Sur and the manufacturing industry in the border region, along with population growth and urban expansion in both areas. Although some competition can be expected from European and Japanese companies, U.S. firms have a definite trade advantage not only because of NAFTA, which has led to a significant reduction of import and export tariffs, but also because of geographic location. California companies in particular can profit from their proximity to the border.

Companies with the newest technologies and competitive pricing probably possess the best possibilities for entering the Mexican environmental technology market. They must be willing to work closely with local and federal authorities and should consider a joint venture with a Mexican company or setting up a subsidiary in the

area. Investors must be aware that permit and business requirements are quite different from their experiences in California. At times, bureaucratic procedures are complex and require patience and expertise to complete. However, sometimes permits and paperwork can be expedited quickly. Currently, the best short-term business opportunities are for engineering firms, service firms, and equipment firms dealing in the products listed in Annex A at the end of this chapter.

The Market in the Border Region

The market in the border region presents slightly different conditions, especially in the field of wastewater treatment. For example, more financing opportunities are available in the border region. Specific border institutions, such as the NADBank and EPA help co-finance certain projects if they are considered low-risk and sustainable. There is also an increased willingness to support infrastructure projects in the Mexican border region when those projects will directly benefit residents on the U.S. side of the international boundary. For more details on finance opportunities, please consult Chapter IX of this manual. A list of planned projects for the border region is attached to this chapter in Annex B.

References

[1] Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT). 2001a. “Programa nacional hidráulico 2001–2006 (PNH). ” (Cited 16 January 2002), http://www.semarnat.gob.mx/programas/hidraulico.shtml
[2] Instituto Nacional de Estadística, Geografía y Informática (INEGI). 2002. “Indicadores de la población, 2000.” (Cited 8 April). http://bc.inegi.gob.mx.
[3] Saldaña, Lori. 2001. “Situación actual de tratamiento de aguas residuales en las ciudad de Tijuana B.C.” Summary of CESPT PowerPoint report, handout, December, San Diego. Unpublished.
[4] Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT). 2001b. “Programa nacional del medio ambiente y recursos naturales 2001–2006 (PNMARN).” (Cited 16 January 2002), http://www.semarnat.gob.mx/programas/medio_ambiente.shtml.
[5] SEMARNAT. 2001. a
[6] International Trade Administration (ITA), U.S. Department of Commerce. 1996. “Mexico Environmental Export Market Plan.” Prepared by Sierra International, LLC. (Cited 28 August, 2001), http://web.ita.doc.gov/ete/eteinfo.nsf/vwQFbyCountry
[7] Morris, Kenn. 2002. “Mexican Municipal and State Bond Financing Update.” San Diego. Unpublished.
[8] Border Environment Cooperation Commission (BECC). 2001? “Water and Wastewater Infrastructure Improvements Tijuana, Mexico: 2001–2005.” San Diego. Unpublished.
[9] Morris, Kenn. 2002. “Water Infrastructure Development Opportunities in Baja California.” San Diego. Unpublished.
[10] Morris. 2002.
[11] Padilla, Aurelio. 2002. Telephone conversation with author. San Diego, California (10 April).

[12] International Boundary and Water Commission (IBWC). 2002. Survey submitted by IRSC staff. San Diego, California.
[13] Dibble, Sandra. 2002. "New Water Crisis for Tijuana: Binational aqueduct pitched, but pipeline may not come in time." *The San Diego Union-Tribune.*(Cited 12 September, 2002)
[14] California Department of Water Resources. 2002. "Regional Colorado River Conveyance Feasibility Study (Binational Aqueduct). (Cited 12 September, 2002), http://wwwdpla.water.ca.gov/sd/environment/binational_aqueduct.html.
[15] Valdes, Judith. 2001. "Commercial Guide for Baja California Sur." *Market Research Reports: Industry Sector Analysis.* Washington, D.C.: International Trade Administration, Department of Commerce.
[16] International Trade Administration, U.S. Department of Commerce. 2001. "Baja California Infrastructure-Desalting Plant." *International Market Insight Reports.* Washington, D.C.: International Trade Administration, U.S. Department of Commerce.
[17] BANOMEX. 1999. "Mexican Import-Export Statistics, January-December 1998." (Cited 15 November).
[18] Valdes. 2001.
[19] North American Development Bank (NADBank). 2002. "North American Development Bank Fact Sheet. Mexicali, Baja California." (Cited 16 April), http://www.nadbank.org/english/projects/Infrastructure/infra_proj_frame.htm.
[20] Banco Nacional de Obras y Servicios Públicos, S.N.C. (BANOBRAS)f. 2002. "Delegación estatal de Baja California. Proyectos ambientales." Reply to survey sent out by IRSC staff. San Diego, California (April 2002)

Annex A[17]

Most promising products for export to Baja California and Baja California Sur

- Chlorinators
- Chlorine contact chambers
- Chlorine diffusers
- Cyclone/grit wash units
- Desalination equipment
- Design and engineering services
- Irrigation equipment
- Mixed sludge pumps
- Primary clarifiers
- PVC pipes
- Sprinkling systems
- Water filtration equipment
- Water meters
- Water pumps
- Water supply and distribution systems

Most promising products for export to Baja California Sur[18]

- 10" steel pipes
- 10" turbine pumps
- 100 hp electric pumps
- 16" steel pipes
- 18" wide pipelines
- Aeration pumps
- Chlorinator
- Desalination systems
- Inhor tank
- Oxidation towel
- Pumping tank
- PVC piping
- Triphasic electric engines
- Water pumps
- Water treatment technology

Annex B

NADBank Funded Projects[19]

Location	Description	Date BECC Certified	NADBank Financing Approval	Construction Status	Total Cost	EPA Grant Amount	Population Benefited
Ensenada	Wastewater Treatment Plant	09-28-95	n/a	redefined	$8,194,000	n/a	250,000
Tijuana	Parallel System/Plant Rehabilitation (San Antonio de los Buenos)	06-18-97	08-17-98	in progress	$27,430,000	$16,000,000	1,128,917
Tijuana	Wastewater Collection System Rehabilitation and Improvements Project	n/a	n/a	in progress	$42,014,408	$18,007,204	n/a
Mexicali	Sanitation Program	12-05-97	11-23-99	in progress	$57,360,000	$20,620,000	635,000
Tecate	Water and Wastewater Project	06-22-00	06-21-00	in progress	$7,813,560	$3,718,580	66,000

Annex C

Other Funding Agencies for Water Projects

BANOBRAS is also helping to finance various projects in the border region. One of them is an upgrade of the sewage system in the city of Ensenada that also includes a project to recycle treated wastewater. This project falls under the jurisdiction of the State Commission for Public Services of the city of Ensenada (Comisión Estatal de Servicios Públicos de Ensenada–CESPE) that is in charge of promoting it. The project has been certified by the BECC, which conducted various studies to determine its feasibility. The amount money that BANOBRAS will contribute to the project has not yet been determined.

Other projects include the construction of wastewater treatment plants, water sample testing, water monitoring, and the rehabilitation of 12 natural water wells. These projects are located in the northern Gulf region, the northern Pacific area, in San Ignacio, in Loreto and in the Valley of Santo Domingo.

National Finance Agency (Nacional Financiera, S.A.–**NAFINSA**) also finances water conservation projects by providing credits, guarantees and risk capital.

Chapter III

Air Quality Management

Overview

Due to both rapid industrial and population growth, Mexico is experiencing many of the same environmental problems that highly industrialized nations have struggled with for years. Air pollution has become a serious problem in most major Mexican cities, including those along the Mexican-U.S. border. The National Environmental Institute (INE) estimates that vehicles generate about 75 percent of air pollution, while industries and other fixed sources, such as gas stations, restaurants, electricity generating plants, and laundromats account for the remainder. Unpaved streets and roads in many urban and rural areas, along with agricultural activities, also produce significant amounts of particulate matter that impact regional airsheds.[1]

Air pollution from mobile sources, such as cars, trucks, buses, and motorcycles, probably pose the largest problem to the population and the environment in major cities along the border. More than half of the vehicles in Mexico are models that are more than 10 years old, have no catalytic converters, and are often in a poor state of repair. Thus, they emit high quantities of contaminants into the atmosphere.[2]

In the border region, pollution from vehicles and other sources is compounded by dry climatic conditions. Air pollution produced on one side of the border is often transported across the border by winds. Many border twin-cities share the same air basin. Thus, regional transborder air pollution is best addressed on a binational level.

In the parts of Baja California farther from the border and in Baja California Sur, air pollution is not a significant problem. The region is sparsely populated and there is virtually no heavy industry. Therefore, U.S. companies interested in exporting air pollution control equipment to the Baja California peninsula should concentrate their efforts mainly in the border region.

Government Air Pollution Policies and Programs

Air Pollution Policies

SEMARNAT, the Mexican environmental secretariat, has developed a six-year environmental protection plan called the National Program for the Environment and Natural Resources (Programa Nacional de Medio Ambiente y Recursos Naturales–PNMARN) that includes a National Air Program (Programa Nacional del Aire). Although this air pollution prevention program focuses mostly on reducing emissions and smog in Mexico City, attempts are being made to extend the program to other major Mexican cities like Tijuana. The program aims to control the levels of carbon monoxide and sulfur dioxide to comply with the national air pollution standards.[3] The Federal Attorney General for Environmental Protection (Procuraduría Federal de Protección al Ambiente–PROFEPA) is responsible for enforcing standards and regulations. PROFEPA levies significant fines to discourage pollution and encourage the implementation of cleaner technologies. This "polluters pay" approach is an important part of Mexico's pollution control strategies.

Since 1994, another program has been developed and progressively implemented: the Mandatory Vehicle Verification Program (Programa de Verificación Vehicular Obligatoria), mainly for Mexico City. This program sets maximum emission limits, displayed in Table 1, for both diesel and regular gasoline vehicles and requires periodic emission checks for vehicles. There are more than 400 verification centers (VERIFICENTROS) to test emissions of gasoline vehicles, 210 mobile stations to test emissions of diesel vehicles, and 350 air monitoring stations to identify levels of vehicles emissions in major cities. Since 1994, car manufacturers in Mexico have also been required to install catalytic converters in all newly manufactured vehicles.[4]

Table 1: Maximum emission limits for vehicles weighing 2,727 kg (6,000 lb) or less [5]

Vehicle Model/Year	Hydro carbons Max. (HC) ppm	Carbon Monoxide Min. (CO) % Vol	Oxygen Max. (O_2) % Vol	Dilution (CO+CO2) % Vol
1979 & older	450	4.0	6.0	7.0 + 18.0

Vehicle Model/Year	Hydro carbons Max. (HC) ppm	Carbon Monoxide Min. (CO) % Vol	Oxygen Max. (O_2) % Vol	Dilution (CO+CO2) % Vol
1980–1986	350	3.5	6.0	7.0 + 18.0
1987–1993	300	2.5	6.0	7.0 + 18.0
1994 & subsequent	100	1.0	15.0	7.0 + 18.0

Another government program that addresses the problem of air pollution is the PROAIRE program, which has been in effect for a number of years in Mexico City. This program, introduced in 1996, proposes solutions to reduce mobile and fixed source air pollution through the conversion of all public transportation vehicles from gasoline to natural gas; the establishment of stricter limits for nitric oxide, a colorless gas that is formed by the combustion of nitrogen and oxygen; and the introduction of TIER II vehicles (TIER II vehicles meet U.S. emission requirements).[6]

To date, both of these programs have been implemented mainly in Mexico City, but it is expected that they will be extended to major cities in the border region in the coming years.

Mexican and U.S. Ambient Air Pollution Standards

Table 2 demonstrates that air pollution standards in Mexico are quite similar to those in the United States. Enforcement is an ongoing concern and is a priority of the Fox administration.

Air Pollution Control Programs and Projects in the Border Region

Within the Mexican-U.S. border region, and specifically in the California-Baja California region, there are several air quality monitoring programs that involve U.S. and Mexican collaboration. The agencies involved on the U.S. side include the U.S. Environmental Protection Agency (EPA) and the California Air Resources Board (CARB). On the Mexican side, the National Environmental Institute (INE), Secretariat for the Environment and Natural Resources (Secretaría Nacional para el Medio Ambiente y

Recursos Naturales–SEMARNAT), and the Technological Institute of Tijuana (Instituto Tecnológico de Tijuana–ITT) participate in the program.

There are currently two projects underway. One is the Tijuana-San Diego Air Program and the other is the Mexicali-Imperial Valley Air Program. Both have been in effect since 1995. A number of air monitoring stations measure the levels of nitrogen oxides, ozone, carbon monoxide, sulfur dioxide, particulate matter (PM-10), lead, and select airborne toxic compounds in the air. The Border Information Center on Air Pollution (Centro de Información sobre Contaminación del Aire–CICA) makes the data analyses available after verification through its web site.[7]

Table 2: Comparison of Mexican and U.S. Federal Air Pollution Standards[8]

Pollutant	Mexican Standards		U.S. Standards	
	Standard in Units	Time Period	Standard in Units	Time Period
Ozone	0.11 ppm	1 hour	0.12 ppm	1 hour
Sulfur Dioxide	0.13 ppm 0.03 ppm	24 hours Annual*	0.14 ppm 0.03 ppm	24 hours Annual*
Nitrogen Dioxide	0.21 ppm	1 hour	0.053 ppm	Annual*
Carbon Monoxide	11 ppm	8 hours	9.00 ppm	8 hours
Total Suspended Particles (TSP)	260 µg/m3 75 µg/m3	24 hours* Annual		
Particulate Matter the size of 10 microns or less (PM-10)	150 µg/m3 50 µg/m3	24 hours Annual*	150 µg/m3 50 µg/m3	24 hours Annual*
Lead	1.5 µg/m3	3 months	1.5 µg/m3	3 months

**Arithmetic mean*

Recently, CARB, in coordination with the California Environmental Protection Agency (Cal/EPA), the Bureau of Automotive Repair (BAR), and the city of Tijuana, participated in the development of a pilot vehicle emissions inspection program in the city of Tijuana. This program aims to make emission inspections mandatory for both diesel and gasoline powered engines and is meant to enhance the air quality in the Tijuana region. The first step of the smog check program only applies to Tijuana's 800 official vehicles. Plans exist to extend the program to include Tijuana's taxi fleet and,

ultimately, all vehicles in Tijuana.[9] As environmental administration becomes more decentralized in Mexico, more municipalities will become involved in local environmental regulation and enforcement. For example, Tijuana now has a municipal environmental department and a set of environmental regulations. One of its first activities will be the vehicular emissions control program mentioned above. The Trust Fund for Electric Energy Savings (FIDE), a private Mexican trust fund that was created through the initiative of the Federal Electricity Commission (Comisión Federal de Electricidad–CFE) finances various projects that deal with air emissions control and reduction. It is currently completing a project in which older air conditioning coolants in businesses and homes are replaced by newer ones that are less harmful to the ozone layer. While not border-specific, this program could be of assistance for future projects in the border region.[10]

Best Market Prospects

Air pollution is a major concern in the border area since it impacts both Mexico and the United States. Thus, government agencies on both sides of the border have been actively promoting “cleaner air” strategies. Market prospects for exporters of air pollution equipment are good in northern Baja California for both mobile source and fixed source polluters. It is important to note that air emissions from fixed sources for federal facilities, such as the power plants of the CFE or PEMEX (Petróleos Mexicanos, the national oil company) processing facilities, are set by the Mexican federal government. For large industrial operations, emission standards are also set by federal statute.

Mobile Sources

New inspection stations throughout Baja California will require automobile emissions testing equipment. Equipment for air quality monitoring stations is also needed in the Tijuana-Playas de Rosarito-Tecate-Mexicali border region. Catalytic converters and other pollution control equipment are also in demand for new and used vehicles. The demand for compressed natural gas (CNG) conversion kits, CNG

vehicles, and CNG filling stations should increase substantially in the next few years once the requisite natural gas distribution systems are operational.

Fixed Sources

Due to the fact that the Mexican government is actively promoting a switch to natural gas and low sulfur oil, U.S. firms specializing in natural gas-fired boiler and related conversion technologies will find market opportunities. U.S. firms specializing in end-of-pipe treatment will need to research the market carefully to identify realistic opportunities for the sale of equipment such as scrubbers and baghouses. The market prospects for these products should be fairly promising in the Tijuana-Mexicali region. The market for vapor recovery equipment for gas stations is also very attractive, but since the installation of vapor recovery systems is a fairly recent development, their success has not yet been adequately measured. A list of best sales prospects follows in Annex A.

References

[1] International Trade Administration, U.S. Department of Commerce. 2001. "Current Environmental Challenges." *International Market Insight Reports.* Washington, D.C.: International Trade Administration, U.S. Department of Commerce.
[2] Ceron, Francisco. 1999. "Vehicle Emissions Control Technologies." *Market Research Reports: Industry Sector Analysis.* Washington, D.C.: International Trade Administration, U.S. Department of Commerce.
[3] Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT). 2001. "Programa Nacional de Medio Ambiente y Recursos Naturales 2001–2006." (Cited 16 January 2002), http://www.semarnat.gob.mx/programas/medio_ambiente.shtml.
[4] Ceron 1999
[5] Ceron 1999
[6] Secretaría de Medio Ambiente (SMA). 2002. "Hacía un programa de Calidad del Aire 2000–2010." (Cited 15 April), http://www.sma.df.gob.mx/publicaciones/aire/prog_cal_aire00_10/2000/esp/capitulo02.pdf; International Trade Administration, U.S. Department of Commerce. 2001.
[7] U.S. Environmental Protection Agency (EPA). 2001. "U.S.-Mexico Border XXI Frontera XXI. Mexicali-Imperial Valley and Tijuana-San Diego Air Programs." (Cited 30 November), http://yosemite1.epa/gov/oia/MexUSA.nsf.
[8] U.S. Environmental Protection Agency (EPA). 2001. "Air. U.S.-Mexico Border Environmental Indicators 1997: chap2." (Cited 7 December), http://www.epa.gov/usmexicoborder/indica97/chap2.htm., and U.S. Environmental Protection Agency (EPA). 2002. "National Ambient Air Quality Standards." (Cited 12 April), http://www.epa.gov/airs/criteria.html.
[9] Norzagaray Roman, Rosario. 2002. Interview by IRSC staff. Dirección Municipal de Ecología, Tijuana, Baja California, Mexico (March 2002).
[10] Urteaga Dufour, José Antonio. 2002. Interview by IRSC staff. FIDE, Tijuana, Baja California, Mexico (March 2002).
[11] Ceron 1999 and The U.S. Commercial Service. 2002. "Mexico Country Commercial Guide FY 2002." (Cited 15 April), http://www.usatrade.ogv/Website/CCG.nsf/CCG-Mexico2002-CH-5:-0055762.

Annex A[11]

Best Sales Prospects

- Air monitoring station equipment and related data acquisition systems
- Air monitoring stations for diesel engines
- Baghouses and scrubbers
- Catalytic converters
- Dual natural gas/gasoline fuel systems
- Gas analyzers
- Gas flow meters
- Gas meters
- Natural gas storage tanks equipped with meters for service stations
- Public electric vehicles
- Software programs to measure vehicle air emission

Chapter IV

Energy Efficiency and Renewable Energy

Overview

Mexico has abundant reserves of petroleum and natural gas, yet the energy sector is facing important challenges. Strong economic and population growth is causing demand for natural gas and electric energy to outpace the country's ability to generate and deliver additional supply. Lack of investment capital for major energy infrastructure constrains major infrastructure projects like natural gas pipelines, transmission lines, and power plants and prevents electricity-generating capacity from matching the pace of expanding electricity demand. According to the U.S. Department of Energy, shortages in Mexico of electricity are predicted for as early as 2003.[1] As a result, the Mexican government's attention is turning toward private-sector funding. Mexico and the United States are working to improve their energy ties. Planned power plants could also help satisfy the energy needs both for northern Mexico and Southern California. Cross-border ties with Southern California are very important for Baja California because it is isolated from the Mexican national electric grid. Such is the case for the state of Baja California Sur as well.

While the total generation capacity for electricity in Baja California was about 2,115 MW in 2000, Baja California Sur generated only 342 MW. Given the enormous increase in demand for electricity, this level of installed capacity will not be sufficient in the future. As such, the market for electric power generation is one of the strongest in the peninsula. It offers many opportunities for firms that provide solutions for improving energy efficiency and renewable energies. The continued liberalization of investment rules for the energy sector should increase these opportunities even more.

Energy Production and Consumption

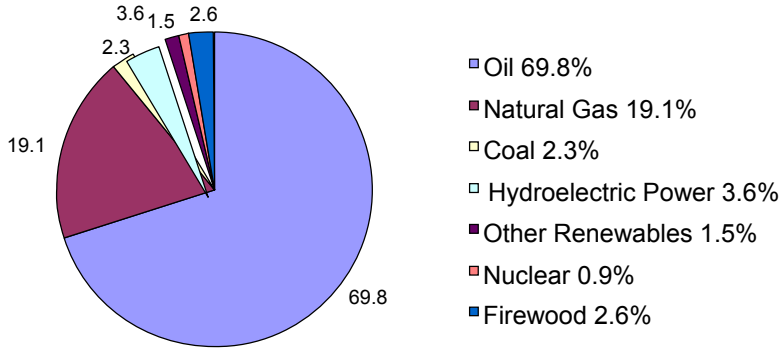

Figure 1: Energy Produced in Mexico in 2000[2]

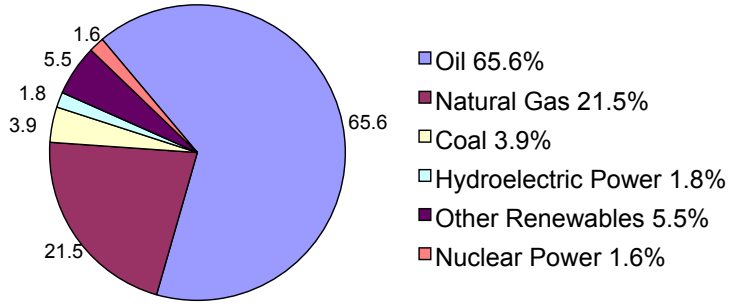

Figure 2: Energy Consumed in Mexico in 1999[3]

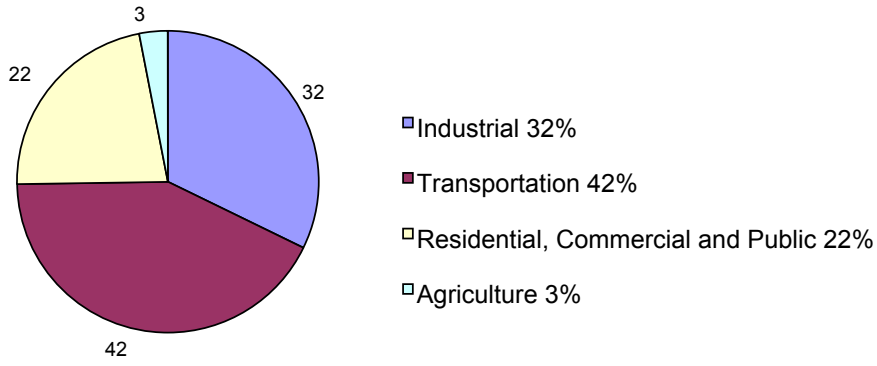

Figure 3: Sectoral Energy Use in Mexico in 2000[4]

Mexico's Energy Policy

According to analyses by the U.S. Department of Energy, Mexico's energy policy has three main objectives: (1) to achieve a rapid and efficient *expansion* of the energy sector; (2) to promote key *investment* for long-term growth with strong private participation; and (3) to strengthen and improve the *efficiency* of public-sector enterprises. A main focus is on expanding the natural gas market and reducing reliance on fuel oil. It is Mexico's official policy to make natural gas its principal source of fuel in the future, which is supported by legal reforms published in November 1995. The reforms allow the private sector to build, operate, and own facilities for the distribution, storage, and transportation of natural gas.[5]

According to the Mexican Ministry of Energy (Secretaría de Energía–SENER), natural gas has several advantages: (1) it is a relatively cheap fuel; (2) the combustion is complete and clean, producing almost no sulfur dioxide; (3) the operation is secure; and (4) it is more energy efficient, especially if combined-cycle technology is used.

Like the oil and natural gas sector, liberalization of Mexico's electric power industry has begun, although on a limited basis. While the transmission and distribution of electric current is still reserved for the public sector, power generation is now open to private investors. By 2002, the Mexican Energy Regulatory Commission (Comisión Reguladora de Energía–CRE) had issued 192 private-sector permits nationwide.[6] In the years from 1995 to 2000, the private-sector share of Mexico's total electricity production rose from 5.5 percent to 6.3 percent.[7] Recently, there has been a significant expansion of electric generation capacity in Mexicali with initiation of plant construction by Sempra Energy and InterGen Energy, Inc. The InterGen facility will be a 1,065 MW natural gas-fired, combined-cycle facility that will sell 66 percent of its capacity to Mexico's Federal Electricity Commission (Comisión Federal de Electricidad–CFE) and the rest will be for export to California. The Sempra facility will be a

gas-fired, combined-cycle plant with 600 MW capacity. Both plants are expected to come on line in 2003.

As Mexican generating capacity will need to increase by 13,529 MW within the next few years, additional projects will be developed. The CFE recently announced an Independent Power Producer (IPP) tender for an electrical power generation facility of 220 MW capacity in Mexicali. Another CFE tender calls for the construction of an internal combustion power plant with a total capacity of 37.5 MW. The designated site for this diesel power plant is near La Paz, Baja California Sur.[8]

Plans and Projects

Although oil is still Mexico's number one energy source, priority is now given to the development and use of natural gas reserves. Plans exist to increase natural gas transmission within and across Mexico's northern border. There is also an effort nationally to concentrate more on gas exploration and production. The gas industry is regulated by the CRE. However, compared to the oil industry, the natural gas sector is less constrained, which allows private companies into the downstream sector. The most active foreign investors in the natural gas sector are European companies. Sempra Energy is currently the most active U.S. company in Mexico's gas market.

Renewable energy sources remain only a small part of the energy mix in Mexico. However, there are many opportunities to exploit the use of renewable energy technologies in Mexico. Such strategies, combined with an expansion in the natural gas market, could also considerably decrease Mexico's CO_2 production and help reduce levels of air pollution. Mexico has abundant solar and wind resources that could be utilized, but the most important renewable energy source is hydroelectric generation.

Improving energy efficiency is another approach to addressing the problem of rising demand and insufficient production. Mexico has a number of energy conservation agencies, including the National Commission for Energy Savings (Comisión Nacional para el Ahorro de Energía–CONAE) and the Trust

Fund for Electric Energy Savings (Fideicomiso para el Ahorro de Energía Eléctrica–FIDE). CONAE is an independent entity within the Ministry of Energy serving as a consulting body to federal and municipal organizations. FIDE, a private non profit agency, was founded in 1990 to introduce and promote the conservation and efficient use of electric energy.

Energy efficiency and the development of renewable energy generation is not just an issue with regard to the environment. According to CONAE, Mexico's fossil fuels will not last much longer than 40 years if consumption remains at the current level.[9] CONAE and FIDE are supported by the Alliance to Save Energy, an organization that helps Mexican enterprises reduce energy costs, increase productivity, and decrease pollution. The Alliance also published a directory to serve as a networking guide for those interested in implementing energy-saving projects and locating suppliers for the Mexican market (www.ase.org/directoriomexico). On the state level, the Baja California division of the Energy Conservation Program for the Electric Sector (Programa de Ahorro de Energía del Sector Eléctrico–PAESE) is launching programs to save electric energy. According to Ing. Agustín Lara Vela of CFE-PAESE, some companies have reduced their annual energy use by as much as 14 percent.[10]

According to CONAE, more than five million Mexicans have no access to electricity from the national power grid. Renewable energies could be an economical option for those who lack access to the main grid, especially in rural areas, because of incentives created by various government programs. As part of Mexico's Rural Alliance (Alianza para el Campo) program, farmers are encouraged to convert to renewable energy technologies. Farmers receive proportionally larger grants for the purchase of renewable energy systems than for similar systems that are based on fossil fuel. The U.S. Sandia National Laboratory also supports the installation of renewable energy technologies. In 1994, it established the Mexico Renewable Energy Program (MREP). The program provides training and technical assistance as well as financial support. So far, Sandia has installed more than 250 water-pumping stations operated by

solar or wind power as well as 150 other renewable energy projects in 14 Mexican states. One such system was installed in Baja California and 47 others in Baja California Sur. Sandia works with the Mexican government, renewable energy suppliers in the United States and Mexico, universities, and other partners. These programs not only help to develop infrastructure in Mexico's underdeveloped rural areas, but also reduce pollution from fuel-powered generators and broaden the renewable energy market outside the United States. Due to programs like the MREP and Rural Alliance, Mexico's photovoltaic water-pumping market has expanded. At the same time, however, it has become very competitive and profit margins are lower than they used to be.

Natural Gas and Renewable Energy Generation in the Baja California Peninsula

Natural Gas

The natural gas transmission pipeline network is not well developed in Baja California or Baja California Sur, although a number of proposals are underway to expand this infrastructure. In northwestern Mexico, the only injection points are at Mexicali and Tijuana. Two gas turbine power plants fueled by natural gas are located in Rosarito and Tijuana and two more are under construction by Intergen and Sempra in Mexicali. There is no distribution of natural gas in the southern peninsula. Given growing demand, the Mexican Petroleum Company (Petróleos Mexicanos–PEMEX) is expected to expand its infrastructure in the Mexican-U.S. border region.

Sempra Energy Resources, based in San Diego, is building a 600-MW natural gas-fired power plant in Mexicali (Termoeléctrica Mexicali) because of its proximity to the North Baja Pipeline, which is under construction. Intergen is also building a natural gas-fired power plant complex in Mexicali of 1,079 MW capacity. In addition, Sempra Energy is planning to build a liquefied natural gas (LNG) receiving terminal near Ensenada to help Mexico keep up with the region's growing demand for natural gas.

Several other companies have also announced plans to construct LNG terminals in Baja California. In early August 2002, Marathon Oil submitted a permit application to build an LNG project in southern Tijuana. Other partners in the project include: Pertamina, Indonesia's state-owned oil company; Golar LNG, a Norwegian firm; and Grupo GGS, a Mexican development company. The project would include an LNG re-gasification plant that would produce one billion cubic feet of natural gas per day, a pipeline to transport the gas, and a desalination plant that would treat a capacity of 20 million gallons of potable water per day.[11]

Other partnerships to build LNG facilities have been announced, but have not yet applied for permits to develop the projects. In addition to the Sempra project mentioned earlier, Phillips Petroleum and El Paso Corporation, Royal Dutch Oil/Shell, and Chevron Texaco are competing to launch LNG projects in Baja California.[12] The projects face community opposition and concerns about environmental and safety impacts. However, developers argue that the projects would prepare the region for future energy needs. Only one pipeline is needed to satisfy current demands for the region. While the outcome is not yet clear, if one or more of these plans does move forward, opportunities will be created for technology and service suppliers.

Hydroelectric Generation

According to the CFE, hydroelectric electricity generation accounts for about 17 percent of Mexico's total electricity generation. Baja California and Baja California Sur have no large hydroelectric power plants, but there is a small plant of about 20 MW capacity under construction near Tecate to take advantage of water flows from the aqueduct that transports Colorado River water to Tijuana. Due to the region's climatic conditions—approximately 95 percent of the peninsula is classified as dry or very dry[13]—its hydroelectric potential is minimal.

Geothermal Generation

In the past, geothermal energy has represented the most utilized sector of renewable energy sources in Mexico. Mexico's first and largest geothermal power plant is located near Mexicali. The Cerro Prieto plant includes four units that produce 720 MW, or about 80 percent of Mexico's total capacity for geothermal power generation. A smaller geothermal facility of 30 MW is located in the northern part of Baja California Sur at Tres Vírgenes, near the city of Santa Rosalía.

Wind Power

According to SENER, there is great potential for wind-generated energy in San Quintín, Baja California, which could present investment opportunities for U.S. companies. Although wind power accounts for a very small percentage within the total energy production, it should be noted that its share has consistently been on the rise. In the 2001–2006 Sectorial Program for Energy (Programa Sectorial de Energía, 2001–2006), the CFE noted the generation of 1.7 MW by wind power in La Ventosa and Guerrero Negro as one of their outstanding projects. A private project by Fuerza Eólica del Istmo in La Ventosa includes the construction of a wind park with a capacity of 30 MW. Fuerza Eólica del Istmo has also applied for permits for the construction of four more wind power facilities, of which three would be located in the Baja California peninsula.

Solar Energy

CFE is currently working on two different projects related to solar energy. The first is conducted in collaboration with the Institute for Electrical Research (Instituto de Investigaciones Eléctricas–IIE). The IIE is in charge of collecting information from four different types of solar panel systems installed in four houses in the Mexicali area. The goal of this project is to compare the different solar panel systems and to evaluate their capacity in the context of local climatic conditions in Baja California (dust, extreme heat, storms, etc.). The second ongoing project, located in San Juanico, Baja California, also involves these different systems.[14]

Solar energy is widely used throughout the peninsula in rural areas and small towns that are not connected to an electrical grid. Many vacation homes along both the peninsula's Pacific and Gulf coasts use solar panels for lighting, communications, and appliances such as refrigerators. Fishing cooperatives have also installed solar-based systems in isolated fishing camps in Baja California and Baja California Sur. In some cases, these systems have significantly reduced the use of diesel generators.

References

[1] U.S. Department of Energy (DOE). 2002. "An Energy Overview of Mexico." Fossil Energy International (Cited 5 April), http://www.fe.doe.gov/international/mexiover.html.
[2] Instituto Nacional de Estadística, Geografía e Informática (INEGI). 2002. "Sector energético, indicadores anuales, producción de energía, energía primaria." (Cited 5 April), http://dgcnesyp.inegi.gob.mx/cgi-win/bdi.exe.
[3] Energy Information Administration (EIA), U.S. Department of Energy (DOE). 2001. "Mexico: Environmental Issues." (Cited 5 April), http://www.eia.doe.gov/emeu/cabs/mexenv.html.
[4] See page 27 in Secretaría de Energía (SENER). 2001. *Programa sectorial de energía, 2001–2006*. México, D.F.: SENER.
[5] DOE 2002.
[6] The complete list can be found at <http://www.cre.gob.mx/estadisticas2/Materia_Regulada/Electricidad/Perm._Gen._Privada/pgpengia.htm>.
[7] Instituto Nacional de Estadística, Geografía e Informática (INEGI). 2002. "Economic Statistics. Gross Production of Electricity, by Sector, 1990–2000." (Cited 9 April), http://www.inegi.gob.mx/estadistica/ingles/economia/ industria/inu _19html.
[8] For more information see <http://www.usatrade.gov> or contact Arturo Dessommes at (52–55) 5140–2638 or via email at <arturo.dessommes@mail.doc.gov>.
[9] de Buen R., Odón. "Desarrollo de las Energías Renovables en México: la perspectiva de la Conae." Presentation given at "Best Practices on Renewable Energy: Sharing Experiences for Market Development" meeting in Morelos, Mexico on June 21-22, 2001
[10] Lara Vela, Agustín. "CFE-PAESE, división Baja California. 21 Premios nacionales de ahorro de energía eléctrica y la constante búsqueda de la eficiencia energética."
[11] Lindquist, Diane. 2002, August 7. "OK sought for LNG project near Tijuana." *The San Diego Union-Tribune*. (Cited 16 September 02).
[12] Lindquist, Diane. 2002, March 4. "Political, environmental concerns clash over gash terminals on Baja's coast." *The San Diego Union-Tribune*. (Cited 16 September 02).
[13] Instituto Nacional de Estadística, Geografía e Informática (INEGI). 2002. "Aspectos geográficos de Baja California Sur. Climas." (Cited 5 April), http://bcs.inegi.gob.mx/territorio/espanol/climas2.htm.
Instituto Nacional de Estadística, Geografía e Informática (INEGI). 2002. "Aspectos geográficos de Baja California. Climas." (Cited 5 April), http://bc.inegi.gob.mx/territorio/espanol/climas2.htm.
[14] Both projects are coordinated by Arq. Laura Morales Sosa, head of CFE's department for energy savings. She can be contacted at (52–686) 554–8760 or via email at <laura.morales@cfe.gob.mx>.
Morales Sosa, Laura. 2002. Interview by IRSC staff. CFE-PAESE Mexicali, Baja California, Mexico (March).

Chapter V
Industrial Environmental Management

Overview

Although the industrial sector of Baja California is not as well developed as in some other parts of Mexico, there are still opportunities for export of products and services to improve industrial environmental management and energy efficiency. Increased enforcement activity and other programs, like *Industria Limpia* (Clean Industry), that provide incentives for pollution prevention create a demand for Environmental Management Systems (EMS) and develop the market for pollution control goods and services. Environmental training programs offered by several organizations in Baja California can also generate demand for pollution prevention products. The industrial base of Baja California Sur is very limited and thus presents only modest opportunities for California exporters.

Energy Efficiency

While energy costs were not much of a problem for local businesses in Baja California in the past, energy costs have been rising rapidly. Thus, conservation is providing new market opportunities for environmental consultants. A significant concern of companies in Mexicali, in particular, is how to survive the higher energy rate charges that are being applied.[1] Currently, the industrial sector consumes approximately 60 percent of total electrical energy in Mexico.[2] Although Baja California officials have attempted to offset the increase in electricity rates with subsidies, funds are limited. The Fox Administration has made energy efficiency and savings a high priority objective in its Energy Sector Program (Programa Sectorial de Energía 2001–2006).[3] An example of a government initiative to create incentives for conservation is the Trust Fund for Electrical Energy Savings (Fideicomiso para el Ahorro de Energía Eléctrica–FIDE). Although FIDE is a private, nonprofit organization, it was created through

an initiative of the Federal Electricity Commission (Comisión Federal de Electricidad–CFE). FIDE administers the following programs:

- ***Energy savings programs for industrial consumers of energy***. By providing access to financing and conducting energy-efficiency audits, this program promotes the replacement of equipment that uses more energy than necessary (e.g., motors, air compressors, chillers, air conditioning, etc.). The program also examines industrial processes to find opportunities for substituting more energy-efficient techniques in the textile, brewery, bottling, chemical, automotive, metallurgy, cement, and construction sectors, to name some examples.
- ***Large-scale programs*** to replace incandescent bulbs with fluorescents and improve efficiency of air conditioning systems. The goal is to substitute 1.5 million incandescent light bulbs with compact fluorescent bulbs by providing credits to domestic users on their energy bills. The incentives for improving the efficiency of air conditioning systems include similar credit mechanisms.
- ***Market Development and Incentives Program***. This program is financed through an Interamerican Development Bank grant, which provides US$23.4 million or half of the total budget.[4] The goal of this program is to increase the use of tri-phasic induction electric motors (of 5 to 500 HP) and energy-efficient commercial lighting (including linear T-8 lights, low loss ballasts, and energy-efficient compressors). The program uses economic incentives to reward purchasers of energy-efficient equipment. It also reaches out and provides training for distributors and users in order to increase awareness of the benefits of using this equipment and replacing inefficient equipment. Replacement of motors has been especially effective, since they consume over 70 percent of electricity in the industrial sector in Mexico.
- ***Training and Education***. FIDE coordinates with trade associations and higher education institutions to provide about 150 courses and workshops per year, as well as distributing audiovisual and multimedia materials. It also has developed a program for changing cultural awareness on energy efficiency, known by the Spanish acronym of EDUCAREE (or Educación para el Ahorro y Uso Racional de la Energía Eléctrica). This program targets students in grade school and high school. Educational materials are developed for students and their families. FIDE also provides permanent installations at children's museums and science and technology centers in Mexico.
- ***Standardization and Labeling of Energy Efficient Products.*** FIDE supports recognition programs and the developing of standards for energy-efficient products. In particular, FIDE administers the "Sello

FIDE" label, which informs consumers that certain products are, in fact, energy efficient.

FIDE has also worked with hotels, office buildings, industry, and shopping centers to replace air conditioning equipment with replacements that use refrigerants that do not contribute to global warming. Despite the incentives provided by some of these programs, a majority of FIDE's clients are motivated by cost-savings. For more information about FIDE, please visit its web site at: <www.fide.org.mx>.

Environmental Management Systems and Other Voluntary Industry Programs

The demand for Environmental Management Systems (EMS) is usually motivated by the same cost-saving impetus, although in the case of larger companies, market demand can be a factor. Because the industries in Baja California and Baja California Sur are low-impact relative to other industries, ISO 14001 certification is not widespread in industry. The president of CANACINTRA in Mexicali estimates that only 5 percent of their members are ISO 14001-certified or is in the process of obtaining such certification.[5] Even though some large U.S. and Japanese *maquiladoras* have attained certification, smaller organizations have remained uninterested in programs that emphasize continuous improvement. Most companies have been focused on legal compliance and nothing more.[6] For those who are interested in developing an EMS and attaining ISO 14001 certification, it is difficult to find a consultant and registered Mexican auditor located in Baja California.[7] Paying for the auditor to fly in from Mexico City increases the costs of the certification process and constitutes a disincentive for companies. As such, consultants and auditors in Southern California could have an advantage in this arena.

The Mexican government is seeking to remedy this problem by recruiting more accredited environmental auditors. On March 27, 2002, the government of Mexico released a call for environmental auditors. To participate, one must be accredited and approved by the Mexican Accreditation Entity (EMA), which

certifies that an auditor is qualified to carry out environmental audits according to Mexican law.[8] After being accredited, the auditor must then obtain approval from the Secretariat of the Environment. There are several documentation requirements for accreditation.

Interested parties should contact:

Entidad Mexicana de Acreditación
Manuel María Contreras #133, Piso 6
Colonia Cuauhtémoc
06597 México, D.F.
Tel: (52–55) 5591–0539 and 5591–0532
Fax: (52–55) 5591–0529
Web: www.ema.org.mx

Industria Limpia

Industria Limpia, or Clean Industry, has a higher profile than ISO 14001 because it focuses on legal compliance and provides a mechanism for reducing enforcement actions and other regulatory burdens. Recognizing that the enforcement agency had few resources and that funding would be spent best if used to attack the most egregious environmental offenses, the office of the Federal Attorney for Environmental Protection (PROFEPA) developed a voluntary industrial auditing program for industry. Under the program, plants with the *Industria Limpia* certification benefit by being subject to fewer inspections for as long as the company appears to be conforming to the action plan agreed upon by the facility and PROFEPA inspector.

The reduced number of inspections enables regulators to target resources in bringing heavy polluters into compliance, ultimately with greater benefits to the environment. The program has been successful in promoting economic savings for companies, reducing accidents, promoting technological improvements, and increasing environmental services such as recycling and waste reduction. Currently, PROFEPA officials are evaluating possibilities for improving the program by raising its profile and increasing its credibility. To do so, the Fox administration's PROFEPA proposes re-launching the program under a new name, implementing performance indicators to measure the program's

effectiveness, and ensuring that more information becomes publicly available. To bolster the credibility of the system, PROFEPA is improving the certification process for program auditors. Other reforms of the program involve expansion to include economic sectors in addition to manufacturing, such as services, hospitals, and public agencies. PROFEPA officials are also considering ways to incorporate international instruments like ISO 14001 to make the program more seamless for companies that are already ISO 14001-certified.

Trade Associations and Programs

In February 2002, CANACINTRA in Mexicali and PROFEPA signed a formal agreement to help chamber members with environmental problems and to increase communication with regulators through the creation of the Regional Center for Environmental Administration for the Business Sector (Centro Regional de Apoyo de Gestión Ambiental para el Sector Empresarial–CRAGASE).[9] CRAGASE will be located in the CANACINTRA Mexicali building and is funded by member fees. In addition to promoting PROFEPA's environmental auditing program, CRAGASE will focus on small- and medium-sized companies, which is a shift from past efforts.[10]

Enforcement Activities

Because of the emphasis on legal compliance rather than continuous improvement, the best market prospects are tied to enforcement activities of PROFEPA, the federal enforcement agency, and, in some cases, the state and municipal agencies. Decentralization will increase the role of state and municipal agencies in the future. In 2001, PROFEPA Baja California levied nearly US$2 million in fines for violations of environmental laws and approximately 60–70 percent of these took place in Tijuana.[11] PROFEPA also closed nine facilities in 2001 for noncompliance with Mexican law. Baja California's General Directorate of Ecology has also increased its enforcement activities despite a limited staff of eight inspectors.[8] Both PROFEPA and DGE have also increased their community outreach, giving them access to community complaints—an effective source of

surveillance information for enforcers. It is important to note that the *maquiladora* industry is not the only focus of environmental enforcement in Baja California. Mining facilities, maritime zones, and other natural resource areas are also of high priority.

References

[1] Bonfante, Carlo. 2002. Interview by IRSC staff. CANACINTRA, Mexicali, Baja California, Mexico.
[2] Urteaga Dufour, José Antonio. 2002. Interview by IRSC staff. FIDE, Tijuana, Baja California, Mexico.
[3] Urteaga Dufour 2002.
[4] Urteaga Dufour 2002.
[5] Bonfante 2002.
[6] Ruíz Padilla, Alfonso. 2002. Interview by IRSC staff. CANACINTRA, Tijuana, Baja California, Mexico.
[7] López, César. 2002. Interview by IRSC staff. AIM, Tijuana, Baja California, Mexico.
[8] International Trade Administration (ITA), U.S. Department of Commerce. 2002. "Call for Environmental Auditors." *Market Research Reports: International Market Insight.* Washington, D.C.: Author.
[9] Delgadillo, Daniel. 2002. Interview by IRSC staff. CANACINTRA Mexicali, Baja California, Mexico.
[10] Delgadillo 2002.
[11] Alvarez, Alejandro. 2002. Interview by IRSC staff. PROFEPA, Mexicali, Baja California, Mexico.
[12] Manuel Lomelí, Jesús. 2002. "Industrias clausuradas por daño al ambiente." *Frontera.info.* (cited 2 April). http://www.fronteratij.com.mx

Chapter VI

Solid Waste Management

Overview

The market for municipal and industrial solid waste management equipment and services is one of the least developed environmental market segments in Mexico. Although the country generates over 80,000 metric tons of municipal waste each day, only about 83 percent of this waste is collected and only half of the solid waste receives proper handling, confinement, or treatment. Inadequate solid waste treatment is due to lack of infrastructure and low levels of recycling. Few households and industries recycle. Only an estimated 6 percent of the total volume of municipal waste is recaptured daily, despite the estimated recycling potential of close to 30 percent. In addition, industrial solid waste is treated together with municipal solid waste.[1]

Improper solid waste management is a universal problem in Mexico, affecting air, water, and soil. When landfills are not designed properly, pollutants often leak into the groundwater. Landfill gases and fires release toxic fumes and greenhouse gases into the atmosphere. Access to landfills is often not carefully controlled, resulting in the dumping of hazardous waste. With the expansion of the economy, population, and urban areas, many municipal landfills have reached capacity, particularly over the last several decades. A growing industrial sector and higher incomes for consumers have increased the per capita solid waste generation figures. Local governments often lack the financial resources and technical expertise to develop modern solid waste management systems.

The Border Region

Table 1 shows how much waste was generated in 1997 in the three major border cities in Baja California, according to data from the National Environmental Institute (Instituto Nacional de Ecología–INE).

Table 1: Waste Generated Per Capita in Baja California Border Cities[2]

City	Population	Waste generated (tons/year)	Waste generated per capita in 1997 (kg/inhab./day)
Ensenada	314,241	127,085	1.1080
Mexicali	720,945	178,202	0.6772
Tijuana	903,867	342,448	1.0380
Total	1,939,053	647,735	

Mexican border cities and private companies have been moving forward to implement local initiatives to better manage solid waste. The region presents very promising recycling market opportunities due to its proximity to the United States. *Maquiladoras* are often excellent candidates for industrial recycling initiatives. One of these initiatives, the Border Waste Wi$e Project, began in 1997 as a collaborative effort between the cities of San Diego and Tijuana, with support from the EPA and other institutions. It offered on-site technical assistance and training in solid waste management to manufacturers. Company audits identified recyclable solid waste and markets for those materials, enabling many companies to reduce costs and improve profits. Solid waste recycling for industry offers potential business opportunities.

Government Policies and Regulations[3]

The current Mexican administration, under the leadership of Vicente Fox Quesada, has actively promoted the more controlled use of natural resources and is attempting to halt air, water, and soil contamination. The Department for the Integral Management of Pollutants (Dirección General de Manejo Integral de Contaminantes), an entity within the INE, has developed a strategic plan that

clearly defines government objectives and plans. The main objectives outlined in this plan are:

- To minimize the production of waste and adequately manage accumulated waste
- To prevent and control soil, water, and air contamination by industrial and municipal solid waste
- To reduce environmental risks caused by toxic materials

To achieve these objectives, the INE has developed numerous campaigns and projects. One of the top priorities is the development of new government policies to address the problem. The current environmental law, the General Law for Ecological Balance and Environmental Protection (Ley General del Equilibrio Ecológico y la Protección al Ambiente–LGEEPA), which includes legislation related to solid waste, dates back to 1988. A national information campaign has also been developed to encourage the population to use natural resources, such as water and soil, more sparingly and to recycle and reduce waste.

Governmental and Nongovernmental Projects in the Border Region

The city of Tijuana recently upgraded its garbage collection system by purchasing 55 new garbage trucks. The state of Baja California is also constructing two landfills in Tecate and Ensenada that were scheduled to operate by mid-2002. The city of Tecate currently has a loan from NADBank to construct a new sanitary landfill that will move forward once the necessary land is acquired. Plans are also underway for the construction of five other landfills in Tijuana, Rosarito, Mexicali, San Felipe, and in the San Quintín region. Most of these projects are eligible for financing through NADBank since they are located in the border region.[4]

The NADBank, BANOBRAS, and the municipality of Mexicali are cofinancing a project in Mexicali to improve municipal solid waste infrastructure. Plans are underway to construct a new landfill and to upgrade the garbage collection systems, but the project is still awaiting certification by the Border

Environment Cooperation Commission (BECC).[5] NADBank also developed two new solid waste-related programs last year, the Solid Waste Project Development Program (SWPD) and the Solid Waste Environmental Program (SWEP).

The NADBank provides direct grants to border communities through the SWPD program to help with the planning and design of municipal solid waste projects. These projects are then submitted to the BECC for certification are then eligible for NADBank financing (either through NADBank's loan and guarantee program or through SWEP). The grants may be used for the development of master plans, for environmental assessments, topographical studies, and so forth. Single communities may receive up to US$200,000, while regional projects involving two or more communities are eligible for up to US$300,000. Up to 50 percent of the project cost must be matched by the project sponsors.[6]

The NADBank offers a combination of grants and loans through SWEP, for border communities for the improvement of municipal solid waste infrastructure. Only projects certified by the BECC and sponsored by public entities are eligible. Funds cannot be used for the planning or design of projects. Direct grants, concessional loans, or transition assistance (to help ease the transition to new or higher user fees due to increasing debt) are available. Funds can be used for construction and equipment costs, for construction management, and so on. Rather than being limited to financing the construction of landfills, they may also be used to upgrade municipal garbage collection systems or to close existing landfills. Up to US$500,000 is available for single communities and regional projects involving two or more communities can receive up to US$1.5 million. SWEP funds can only finance up to 50 percent of the project and the project sponsor must finance the rest.[7]

SEMARNAT has also developed a nationwide program called *México Limpio* (Clean Mexico), which includes Tijuana. This program actually incorporates a variety of smaller programs aimed at encouraging waste prevention, waste recycling, the rehabilitation of contaminated sites, and

facilitating appropriate management and/or treatment of wastes (both solid and hazardous).[8]

Best Market Prospects

The border region offers opportunities in the area of solid waste management for California companies. There are numerous public and private waste management projects being planned or implemented that provide investment and sales opportunities. With rapid population and industrial growth in the region, the demand for waste management equipment and services is growing. The region is also close to the United States, facilitating transfer of technologies and expertise. In general, solid waste management is one of Mexico's most difficult environmental market segments to break into. As in many cities in the United States, solid waste projects are generally hampered by a poor rate of cost recovery and the municipalities' lack of resources to fully address waste management issues. However, some Mexican municipalities are beginning to consider use of private capital and operator for municipal landfills.

Important projects include the construction of a number of landfills and the acquisition of at least 55 garbage trucks by the municipality of Tijuana. U.S. firms specializing in landfill design and construction as well as equipment providers should have especially good possibilities. Another opportunity might be in the area of recovery of landfill gases for power generation. Such a system is currently operating at the Miramar landfill in San Diego, and its operator, the Environmental Services Department of the city of San Diego, is also converting trash handling trucks to use compressed landfill gases. A list of products needed for the upgrade of the solid waste collection system can be found in Annex A.

References

[1] Sancho y Cervera, Jaime, and Gustavo Rosiles Castro. 2000. "Situación actual del manejo integral de los residuos sólidos en México." México, D.F.: Fundación ICA.
[2] Instituto Nacional de Ecología (INE). 2001 "Misión de la dirección general de manejo integral de contaminantes." (Cited 20 March 2002), http://www.ine.gob.mx.
[3] INE 2001

[4] International Trade Administration, U.S. Department of Commerce. 2001. "Tijuana Upgrades Garbage Collection System." *International Market Insight Reports.* Washington, D.C.: International Trade Administration, U.S. Department of Commerce. And International Trade Administration, U.S. Department of Commerce. 2001. "Landfills for Ensenada and Tecate in Baja California Norte." *International Market Insight Reports.* Washington, D.C.: International Trade Administration, U.S. Department of Commerce

[5] Banco Nacional de Obras y Servicios Públicos, S.N.C. (BANOBRAS). 2002. "Delegación estatal de Baja California. Proyectos ambientales." Reply to survey sent out by IRSC staff. San Diego, California (April).

[6] North American Development Bank (NADBank). 2002a. "Solid Waste Development Program." (Cited 17 April), http://www.nadbank.org/english/program_service/SWPD/swpd_main.htm.

[7] North American Development Bank (NADBank). 2002b. "Solid Waste Environmental Program." (Cited 17 April), http://www.nadbank.org/english/program_service/swep/swep_main.htm.

[8] Lara Moreno, Talpa Dolores. 2002. Inteview with IRSC staff. SEMARNAT, Delegación de Baja California, Mexicali, Baja California, Mexico (March).

Annex A

Best Sales Prospects

- Fifty rear-loading garbage collection trucks with a capacity of 20 cubic yards (preferable brands for the trucks' chassis: Freightliner, International, Kenworth, Ford, and GMC)
- Diesel engines in the following brands: Cummins, Detroit S-60, Caterpillar with a minimum 250 HP, rear axles of 22,000 lbs., front axle of 12,000 lbs., standard transmission with 9–10 speeds (Fuller Eaton)
- Garbage compactors: Leach and/or Pakmor
- Two front loading trucks with 35 cubic yard capacity (preferable brands for chassis: Freightliner, Kenworth, and Peterbilt)
- Diesel engines in the following brands: Cummins, Detroit S-60, Caterpillar with a minimum 300 HP, rear axles of 44,000 lbs., front axle of 18,000 lbs., standard transmission with 9–10 speeds (Fuller Eaton)
- Garbage compactors: Edge and/or Amrep
- Three roll-off garbage trucks for containers of 20 and 35 cubic yards (preferable chassis brands: Freightliner, Kenworth, Peterbilt, and/or International)
- Diesel engines in the following brands: Cummins, Detroit S-60 and/or Caterpillar of 350 HP or more, rear axles of 40,000 lbs., front axle of 12,000 lbs., standard transmission with 9–10 speeds (Fuller Eaton)
- Garbage compactors: Edge and/or Amrep

Chapter VII

Hazardous Waste Management

Overview

Mexico generates a total of approximately eight million tons of liquid and solid hazardous waste per year, but only an estimated 12 percent it is disposed of properly. The remainder is stored at manufacturing plants or illegally dumped in municipal sewage systems, landfills, rivers, and clandestine dumps.[1] Hazardous wastes produced by *maquiladoras* are required to be returned to the country of origin of the materials from which the waste is derived. The U.S.-Mexico Hazardous Waste Tracking System (Haztraks) was created jointly by the U.S. Environmental Protection Agency (EPA) and the Mexican National Environmental Institute (Instituto Nacional de Ecología–INE) and is responsible for monitoring hazardous wastes that are shipped across the border.[2] According to Haztraks data, Mexico exported approximately 11,000 tons of hazardous waste to the United States in 1997. This number differs significantly from data provided by the Secretariat of Environment, Natural Resources, and Fisheries (Secretaría de Medio Ambiente, Recursos Naturales y Pesca–SEMARNAP),[3] due to differences in regulatory definitions of hazardous waste in either country. According to SEMARNAP's data, 31,828 tons of hazardous materials from sources other than *maquiladoras* were exported to the United States for treatment or confinement whereas 51,704 tons had to be returned from Mexico to the United States by *maquiladoras*.[4] NAFTA's Article 303 changed the classification of the *maquiladora* program in 2001, which has affected the restrictions that require hazardous waste from *maquiladoras* to be returned to the country of origin. By 2005, or perhaps even sooner, the shipment across the border of hazardous waste generated in *maquiladoras* will no longer be required.

The existing infrastructure for hazardous waste management is limited and insufficient for processing the waste generated by Mexico's expanding

economy and growing industrial sector. One of the reasons behind improper disposal of hazardous waste is a shortage of disposal and confinement facilities.[5] For example, the only Mexican-approved hazardous waste facility for the Baja California border region is in Monterrey, Nuevo León, several states away from the source.

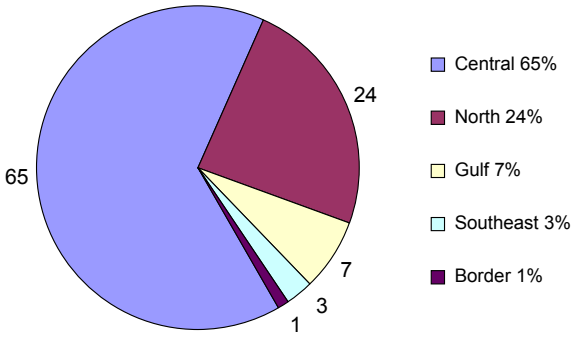

Figure 1: Total Generation of Hazardous Waste in Mexico by Region: 8 Million Tons[6]

The 1988 General Law of Ecological Balance and Environmental Protection (Ley General del Equilibrio Ecológico y la Protección al Ambiente–LGEEPA) defines a substance as hazardous waste according to its particular physical and chemical properties. The Spanish acronym CRETIB refers to the characteristics that define waste as hazardous: corrosive, reactive, explosive, toxic, flammable, or biological-infectious. No distinction is made between hazardous wastes and materials. It is important to point out that Mexico defines hazardous waste differently than the United States. In some cases, standards for what is considered hazardous are more stringent in Mexico than they are in the United States. California, however, has stricter standards than the U.S. federal government.

The INE is a subagency of the Secretariat of Environment and Natural Resources (Secretaría de Medio Ambiente y Recursos Naturales–SEMARNAT) that is in charge of the Hazardous Waste National Register. In 2000, only 8 percent of the generators were registered, but it is the Fox administration's goal

to have the register fully updated by 2006.[7] According to INE's Hazardous Waste National Register in 2000, there were 75 companies in Baja California Sur and 124 companies in Baja California listed as producing hazardous waste.[8] The INE is also responsible for authorizing private companies to collect, recycle, incinerate, treat, and dispose of hazardous waste.

Also under SEMARNAT, the Federal Attorney General for Environmental Protection (Procuraduría Federal de Protección al Ambiente–PROFEPA) is in charge of environmental inspection and enforcement. According to PROFEPA, only 51.8 percent of Mexico's hazardous waste-generating facilities, 43.9 percent of its management companies, and 58.1 percent of the generators of biological-infectious waste were in compliance with the environmental regulations in 2001.[9] The Ministry of Communications and Transportation (Secretaría de Comunicaciones y Transportes–SCT) is responsible for issuing transportation licenses for chemical substances and hazardous wastes.

Plans and Projects

While the problem of hazardous waste management has long been neglected, it is now a higher priority in SEMARNAT. As Environmental Minister Víctor Lichtinger points out, while hazardous waste generation is constantly increasing, the infrastructure for its confinement and the treatment is not. Thus, it is crucial to strengthen the legal framework and increase the capacity of the authorities responsible for inspection and vigilance.[10]

Hazardous Waste Management Plan

In 1996, the Mexican government implemented the Program for Minimization and Management of Hazardous Industrial Waste in Mexico (Programa para la Minimización y Manejo de Residuos Industriales Peligrosos en México 1996–2000) for the period through the year 2000. The program was designed to promote waste reduction and recycling, reduce risks inherent in the handling of hazardous waste, encourage cleaner processes by upgrading technology, reduce the use of raw materials through recycling, and encourage

the development of a new industrial sector. The program also identified a list of the most polluting cities and industrial areas, of which the U.S.-Mexican border region was a part.[11] Several sites in Tijuana are listed as highly contaminated due to the improper disposal of lead.[12] Citizen complaints and increasing public concern about the health effects of these sites may lead to site remediation efforts at these locations in the near future.

The 1996–2000 program included the development of Integrated Centers for the Management and Utilization of Industrial Wastes (Centro Integral de Manejo y Aprovechamiento de Residuos Industriales–CIMARI) run by the private sector. They offer solvent recovery and recycling services, hazardous waste storage, incineration services, and wastewater treatment according to the needs of the region. According to INE, the Baja California peninsula was not an initial target of the CIMARI program.

In 1999, the United States and Mexico signed an agreement regarding hazardous waste facilities. This agreement called for a "consultative mechanism" in which both countries would publicly disclose all existing and planned hazardous waste facilities that lie within 62 miles (100 kilometers) of their joint borders. Hazardous and radioactive waste disposal sites are listed as well as recycling, treatment, and incineration facilities. An inventory listing the facilities in Baja California that fall under the new arrangement follows in Annex A.

In addition, Baja California's environmental authorities, in collaboration with SEMARNAT, plan to build a hazardous waste facility that would treat the waste generated by Baja California's *maquiladoras*. Although the facility is expected to be completed by 2004, a site has not been identified yet.[13]

Soil Remediation

The market for remediation of contaminated soil is definitely incipient. The undeveloped domestic market for soil remediation technology offers significant opportunities for U.S. companies. Because most environmental studies in Mexico have focused on water and air, there is limited knowledge about the flow, final

destination, and effects that hazardous waste has on soil.[14] Within hazardous waste management, the focus is on the confinement, handling, and transportation of hazardous waste and less so on services related to remediation. As border residents become more aware of potential health effects of contaminated sites, it is likely that government agencies will move forward with soil remediation projects.

Due largely to the significant expansion of *maquiladora* manufacturing facilities in Mexico and rapidly growing U.S.-Mexican bilateral trade since NAFTA, the quantities of hazardous materials moving through U.S. and Mexican border communities has increased significantly in recent years. This has raised concerns in Mexican and U.S border communities about the potential threat of hazardous spills as hazardous materials are transported or stored throughout the region. Led by the Border XXI Hazardous and Solid Waste Workgroup, U.S. and Mexican agencies at all levels have cooperated to develop emergency response plans for twin cities along the border. Such a plan for the Douglas, Arizona-Agua Prieta, Sonora, region has been completed. Currently, Science Applications International Corporation (SAIC) has a contract to develop an emergency response plan for the Tijuana-San Diego region. There are no emergency response plans for other areas along the California-Baja California border.

Mexico as a Potential Market

Because the infrastructure for the treatment of hazardous waste is so limited in Mexico, its market offers significant potential for investment. However, there are some obstacles to overcome, including the lack of community acceptance of the need for hazardous waste landfills and incineration sites and the consequent difficulty in obtaining the permits to build them. The prices for confinement, recycling, and treatment of hazardous waste are much lower in Mexico than in the United States. However, operational costs are very much the same in both countries.

The most important end-users in the public sector for hazardous waste infrastructure include PEMEX, the government-owned petroleum company, and

the Federal Electricity Comission (Comisión Federal de Electricidad–CFE). Main users in the private sector are chemical, rubber, plastic, oil, and coal derivative companies that often store their waste in drums at their facilities. Other potential end-users are in the electronics, textiles, leather, non-metallic, and basic metallic industries. The mining sector is an important end-user in other parts of Mexico, but not in Baja California or Baja California Sur. As Mexico's tracking and enforcement improves in the years ahead, the demand for this infrastructure will increase.

According to the International Trade Administration of the U.S. Department of Commerce, the best sales prospects for U.S. companies in the remediation market are the following:[15]

- Services for the detection of contaminated sites
- Services for the elimination of sources of contamination
- Customized engineering proposing feasible remediation technologies and other services
- Remediation technologies themselves, such as chemicals for bioremediation, sandblasting equipment, air and water separators, gas extraction equipment, cleansing agents, drilling equipment, laboratory and analytical equipment and services, among others
- Engineering services for the implementation of spill prevention and control programs
- Risk analyses for different materials and facilities, administrative controls, contingency plans, training, and so forth.

A list with the best sales prospects according to the International Trade Administration of the U.S. Department of Commerce is included in Annex B.

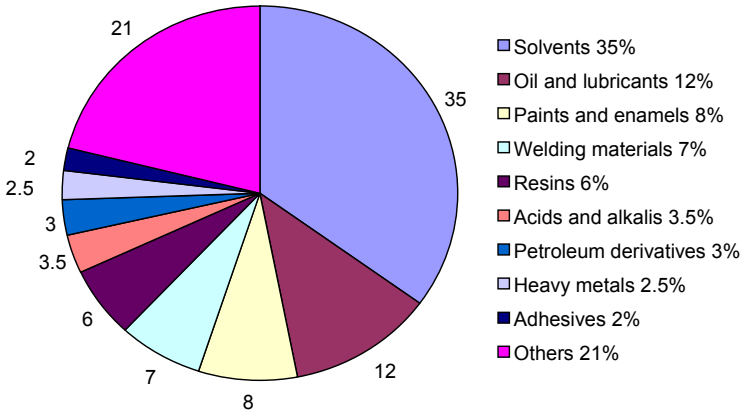

Figure 2: Products as a Source of Hazardous Waste[16]

Annex A[17]

Hazardous and Radioactive Waste Facilities Covered under the "Consultative Mechanism" in Baja California (October 2001)[18]

Facility	Location	Type of Waste(s)	Treatment (T)/ Storage (S)/ Recycler (R)
a) Commercial facilities that treat or dispose of hazardous waste generated off-site			
Bio-Infex Servicios y Tecnología, S.A. de C.V.	Tijuana	Sterilization of biological waste	T
Técnicas Medioambientales Winco, S.A. de C.V.	Tijuana	Sterilization of biological waste	T
Dryer Technology de México, S. de R.L.	Tijuana	Flammable solid and liquid wastes	T
b) Commercial facilities that recycle hazardous waste generated off-site			
Industrias de Grasas y Derivados, S.A. de C.V.	Tijuana	Recycling of spent lubricant oil	R
Industrias P. Kay de México, S.A. de C.V.	Tijuana	Recycling of tin-lead solder	R
Nueva Exportadora Latina de México, S.A. de C.V.	Mexicali-Tijuana	Recycling of spent lubricant oil	R
Óxidos y Pigmentos Mexicanos, S.A. de C.V.	Tijuana	Recycling of non-ferrous metals, smelting; recovery of lead oxide from used batteries	R
Recicladora Temarry de México, S.A. de C.V.	Mexicali-Tijuana	Recycling of spent solvents	R
Servicios Ecológicos Gal, S.A. de C.V.	Tijuana	Recycling of 200-liter metal and plastic drums; recycling of textile material contaminated with grease, oil, and solvents	R
Solver, S.A. de C.V.	Tijuana	Recycling of acidic and alkaline aqueous solutions, used solvents, contaminated oils, and paint wastes	R
Cementos Guadalajara, S.A. de C.V.	Ensenada	Recycling of alternate fuels and used oils	R

Facility	Location	Type of Waste(s)	Treatment (T)/ Storage (S)/ Recycler (R)
c) Commercial facilities that temporarily store hazardous waste generated			
Gonhermex, S.A. de C.V.	Tijuana	Used automobile batteries	S
Great Western de México, S.A. de C.V.	Tijuana	Copper chloride solder in solid and liquid state	S
Industrias Crown Chemical, S.A. de C.V.	Tijuana	Empty containers that contained hazardous materials and wastes	S
Pacific Treatment Environmental Services, S.A. de C.V.	Tijuana	Acidic wastes, paints, metals, asbestos, used oil, and solid wastes; flammable solids, spent oils, acidic and alkaline solutions, halogenized solvents, resins, insecticides, flammable liquids and metals; flammable and toxic liquids and solids	S
Procesos Industriales Cachanilla, S.A. de C.V.	Mexicali	Hazardous wastes (no PCBs)	S
STR de México, S.A. de C.V.	Tijuana	Contaminated, toxic, and flammable liquids and solids, except PCBs and bioinfectious wastes	S
Sessa, S.A. de C.V.	Tijuana	Flammable wastes and organic peroxides, empty drums, PTAR sludge, electroplating sludge, rags, filters, glass, and plastic contaminated with sludge and/or oil, metal slag, flammable solids	S
Sistemas Ecológicos para la Protección Ambiental, S.A. de C.V.	Tijuana	Contaminated solids and liquids	S
Servicios Ambientales Mexicanos, S.A. de C.V.	Tijuana	Alkaline, corrosive, flammable, acidic, and toxic wastes; liquid and solid alkaline and corrosive wastes; flammables, acids, and toxic wastes	S
Técnicas Medioambientales Winco, S.A. de C.V.	Tijuana	Biological waste	S
Protectora Ambiental y Ecológica de México, S.A. de C.V.	Tijuana	Liquid and solid waste from x-rays, film, photographic negatives, and toner and fixer waste	S

Facility	Location	Type of Waste(s)	Treatment (T)/ Storage (S)/ Recycler (R)
Enertec México S. de R. L. de C.V.	Tijuana	Used batteries	S

Annex B[19]

Best Sales Prospects for Hazardous Industrial Waste Equipment Market:

- Polymer deposits
- Filtration membranes
- Corrosive liquid containers
- Condensing crystallizers and refrigerators
- Enameled containers
- Other steel containers/deposits
- Burners
- Industrial autoclaves
- Refining turbinators
- Fiber crushers
- Blade-crushing machines
- Hammer or percussion crushers
- Garbage compactors
- Mixers, crushers, mills
- Tubular catalytic reactors
- Special vehicles
- Bulk transport containers
- Industrial ovens

References

[1] Varady, Robert, Patricia Romero Lankao, and Katherine Hankins. 2001. "Managing Hazardous Materials along the U.S.-Mexico Border." *Environment* 43 (10): 22–36.
[2] For more information on Haztraks see <http://www.epa.gov/earth1r6/6en/h/haztraks/haztraks.htm>.
[3] Under the Fox adminstration SEMARNAP changed its name to Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT).
[4] U.S. Environmental Protection Agency (EPA) and Secretaría de Medio Ambiente, Recursos Naturales y Pesca (SEMARNAP). 2001. *The U.S.-Mexico Border XXI Program: Progress Report 1996–2000*. Washington, D.C.: EPA and SEMARNAP.
[5] Instituto Nacional de Ecología (INE). 2001. "Programa para la Minimización y el Manejo Integral de los Residuos Industriales Peligrosos en México. 1996–2000." (Cited 25 February 2002), http://www.ine.gob. mx/upsec/programas/prog_rip/presenta.htm
[6] Instituto Nacionál de Ecología (INE). 2001. "Programa para la Minimización y el Manejo Integral de los Residuos Industriales Peligrosos en México. 1996–2000.Generación anual por regiones." (Cited 6 March 2002), http://www.ine.gob.mx/upsec/ programas/prog_rip/gen-est.htm.
[7] Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT). 2001. "Programa Nacional de Medio Ambiente y Recursos Naturales 2001–2006." (Cited 3 April 2002), http://www.semarnat.gob.mx/programas/medio _ambiente.shtml.
[8] Ceron, Francisco. 2000. "Hazardous Industrial Waste Equipment Market: Mexico." *Market Research Reports: Industry Sector Analysis*. Washington, D.C.: International Trade Administration, U.S. Department of Commerce.
[9] Procuraduría Federal de Protección al Ambiente (PROFEPA). 2002. "Verificación industrial. Sistema de índices de cumplimiento de la normatividad ambiental." (Cited 12 April), http://www.profepa.gob.mx.
[10] Galván García, Matilde. 2001. "La política ambiental en México en la nueva época." *Ingeniería y Ciencias Ambientales* 52 (March-April): 16–21.
[11] Ceron 2000.
[12] González, Jesús S. 1997. "Mexico—Soil Remediation Services." *Market Research Reports: Industry Sector Analysis*. Washington, D.C.: International Trade Administration, U.S. Department of Commerce.
[13] International Trade Administration, U.S. Department of Commerce. 2001. *Major Projects Quarterly Report—November 2001: Mexico*. Washington, D.C.: International Trade Administration, U.S. Department of Commerce
[14] González 1997.
[15] González 1997.
[16] Instituto Nacionál de Ecología (INE). 2001. "Programa para la Minimización y el Manejo Integral de los Residuos Industriales Peligrosos en México. 1996–2000. Generación por tipo de residuos." (Cited 6 March 2002), http://www.ine.gob.mx/upsec/ programas/prog_rip/gen-est.htm.
[17] U.S.-Mexico Border XXI Frontera XXI
[18] Hazardous and Solid Waste Workgroup U.S.-Mexico Border XXI Program. "Consultative Mechanism—Hazardous and Radioactive Waste: Mexico Facility List." (Cited 16 April), http://www.epa.gov/usmexicoborder/ef-haz.htm.
[19] Ceron 2000.

Chapter VIII

Agriculture

Overview

According to the Secretariat for Agricultural Development (Secretaría de Fomento Agropecuario–SEFOA) of Baja California, about two hundred thousand people in Baja California earn their living from agriculture. The average wage ranges between one and two minimum wages. The greatest problem that farmers in the arid Baja California peninsula have to deal with is the scarcity of water. Without irrigation, the extensive cultivation of vegetables, grain crops, and fruit would be impossible. The major cultivation areas in Baja California include the coastal zone from Tijuana to Ensenada, the Ojos Negros valley, the San Vicente region, the San Quintín region, and the Mexicali Valley. In Baja California Sur, the only important agriculturally productive land is found around Ciudad Constitución.

Both Baja California and Baja California Sur produce a large variety of crops. The major cyclical crops in Baja California include red tomatoes, grain wheat, spring onions, strawberries, seed cotton, cucumber, lettuce, onions, fodder sorghum, and green tomatoes. The most important perennial crops are alfalfa (green alfalfa and *alfalfa achicalada*), asparagus, grapes, flowers, dates, and bermuda grass seeds. Baja California is listed as Mexico's number one producer of red tomatoes, spring onions, flowers, dates, and bermuda grass. Baja California Sur produces smaller quantities of crops than the northern peninsula. However, the state is still one of Mexico's main producers of red tomatoes, grain chickpeas, cherry tomatoes, basil, strawberries, asparagus, *alfalfa achicalada*, fruit trees, and figs.

Environmental Projects in Baja California

Mexico's Secretariat for Agriculture, Cattle, Fishing, and Food (Secretaría de Agricultura, Ganadería Rural, Pesca y Alimentación–SAGARPA) is clearly focusing on rural development rather than environmental projects. However, there are a few projects underway in Baja California that are related to the environment. These projects are carried out by the Secretariat for the Development of Agriculture and Fishing (Secretaría de Fomento Agropecuario–SEFOA) of Baja California with the goal of supporting the growth and sustainability of the agricultural producers in Baja California.

Most of the programs deal with water issues because the scarcity of water is one of the major challenges for agricultural growth in the region. Due to the high salinity of water delivered to northern Baja California from the Colorado River, one of the environmental focuses of SEFOA—in coordination with National Water Commission (Comisión Nacional del Agua–CNA)—is improving the quality of water used in agriculture in Baja California. SEFOA is also working on the remediation of high-salinity agricultural soils. According to the agency's estimates, approximately 25 to 30 percent of the Mexicali region's total agricultural land faces severe salinity problems. Although 50,000 hectares need to be treated, only 2,200 hectares (4.4%) have been recovered over the last five years.

Another of SEFOA's priorities is the recharging of aquifers in the coastal zone (Valle de Guadalupe, Ensenada, Ojos Negros, and San Quintín regions) of Baja California where wells are the primary source of agricultural water. According to SEFOA, this problem could lead to a serious water crisis within the next 20 to 30 years. The construction of surface water barriers slows the flow of water and allows its retention, which helps to recharge the wells. There are also some pilot programs underway that promote agricultural water conservation. These programs are carried out in cooperation with SAGARPA.

To prevent the accumulation of solid wastes such as agricultural plastics and organics from clogging runoff drainage systems, SEFOA is also focusing on agricultural waste management. In addition, the agency is responsible for

reforestation and fire prevention programs in some of the forested areas in Baja California. The forest management activities are actually the only environmental projects that fall under SEFOA's direct responsibility.

Companies that seek to become a supplier to SEFOA, must first register with the government of Baja California. Another option, however, are direct contracts with private agricultural producers. For more information on SEFOA and its projects, contact Lic. Candelario López at (52–686) 555–4930.

Chapter IX:

Finance Opportunities in the Mexican Environmental Export Market

Overview

This chapter identifies some of the finance possibilities that exist for U.S. companies interested in exporting environmental technology to Mexico and the different finance options (loans, grants, guarantees, etc.) that exist for Mexican companies (small, medium, large) and municipalities to acquire environmental technology and/or services. Project financing is currently one of many challenges to environmental market growth in Mexico.

The environmental sector has largely recovered from the 1994 peso devaluation that severely crippled most of the Mexican economy. The majority of environmental projects then under construction had been financed by loans with variable interest rates, but surging interest rates generated by the peso devaluation cancelled or postponed many of them. Although today the environmental sector market volume is still not quite up to pre-devaluation levels, economic forecasts suggest steady growth rates in the environmental sector market over the next few years. It is expected that the total market volume will reach pre-devaluation levels in the near future.

Although financing for projects is available in Mexico, it is often expensive for Mexican businesses and municipalities due to high interest rates and other fees. By law, only the federal government can incur foreign debts. As such, all low-interest loans and bonds provided by multilateral banks must be channeled through either BANOBRAS, the national development bank; FINFRA, the private-sector development bank; or the Central Bank of Mexico before they reach the municipalities or companies that applied for them. Since most loans are granted in U.S. dollars and must be converted to Mexican pesos, a mark-up is charged to

cover transaction costs and spread fees, making low-interest loans quite expensive. Another consideration is the fact that the national development banks and the Central Bank of Mexico do not charge lower interest rates for foreign-origin loans. Rather, interest rates reflect domestic market rates.[1]

The border region presents a slightly different scenario because states and municipalities can apply for direct loans through NADBank, thereby lowering costs considerably. In the 1998–1999 period, the NADBank created a financial entity in Mexico precisely for that purpose called the Sociedad Financiera de Objetos Limitados (SOFOL), which allows it to directly convert U.S.-denominated loans into pesos, thus bypassing BANOBRAS and FINFRA.[2]

In 2001, the Mexican government passed a fiscal reform package for Mexico's securities and exchange markets. This package included specific legislation authorizing Mexican municipalities and states to issue certified debt (i.e., municipal and state bonds). Although municipalities and states have yet to issue bonds, they have been working closely with both Moody's and Standard & Poor's to obtain credit ratings in preparation for future bond issuances. Twenty-three states and nearly 30 municipalities have been rated so far by agencies such as Standard & Poor's. Both the municipality of Tijuana and the state of Baja California were rated in the year 2000 by Standard & Poor's and received among the highest marks in the nation.[3]

Location	Date Rating Received	Rating *
City of Tijuana	05-Sep-00	mxAA
State of Baja California	17-Nov-00	mxAA-
State of Baja California Sur	17-Nov-00	mxA-

*These are state and municipal ratings; sovereign (country) ratings reflect the overall debt ratings (both in local and foreign currency) in a given country.

In February 2002, Mexico was only the fourth country in Latin America to receive a triple "B" foreign currency sovereign credit rating. The "BBB-" is an investment grade rating that makes it attractive for companies and institutions to invest more money and make loans in Mexico; it reflects that Mexico's currency

is stable enough to repay incurred foreign debts without the danger of short-term illiquidity and fluctuating foreign exchange rates. [4]

The passage of this new fiscal law will likely have far-reaching consequences for the financing of new projects across the country since it will considerably facilitate the potential for the Mexican public sector to obtain loans and finance the construction of much-needed infrastructure projects. As seen in the proposed use of funds by the Municipality of Aguascalientes, public works projects likely to receive funding will include regional development plans, urban electrification, water projects, and other basic infrastructure. A short explanation of all the different financing possibilities for both the private and public sectors is given below. Some of this information is based on a report provided by the Office for Environmental Technologies Industries, a department in the International Trade Administration in the U.S. Department of Commerce.

Finance Possibilities for Californian Companies

Debt Financing[5]

***Core features**:* Loans are the most traditional method of financing in the United States. The debt creates an obligation to pay back the loan with interest over a specified period. Debt holders acquire a claim to a business' income, earnings, or assets that takes precedence over the claim of equity holders. Once the obligation is met, creditors have no say in the business, unlike equity investors. However, because of a lack of credit history and other perceived risks of small businesses, debt can be costly, hard to find, and when available, rigid terms can be tough if earnings decline.

***Types**:* Many debt instruments are available from the U.S. private sector to finance environmental exports and overseas projects. Commercial banks provide the bulk of trade finance, commercial lending, and project finance. Bonds, which are usually underwritten by investment banks, are a major financing vehicle used by private firms to obtain working capital and by governments to fund specific projects. In addition, various types of infrastructure funds, both public and private, global and domestic, are available. Examples of such funds are provided throughout this chapter because infrastructure funds provide both equity and debt. Debt finance vehicles available from international markets (not discussed here) include syndicated loans and Eurobonds.

The U.S. Government and the governments of other industrialized countries, as well as multilateral aid agencies, make up the bulk of public-sector lenders. Very often, private lenders are reluctant to finance export transactions or projects abroad because the risk of not getting paid or not obtaining forecasted revenues is much larger than with purely domestic ventures. To cover deals that cross national borders, lenders often require more protection against nonpayment.

Limitations: Borrowing money will be more costly and the terms more variable for small or start-up firms than for established companies. Ease of borrowing also depends on how well the economy is doing. The obligation to repay outstanding loans is paramount, even in times of operating deficits.

For more information: DeThomas, Arthur R. 1992. *Financing Your Small Business: Techniques for Planning, Acquiring and Managing Debt.* Oasis, 1-800-228-2275.

Debt Financing

Financing possibilities for Californian companies

Private Sources of Debt Finance
- Commercial Banks
- Business Development Corporations (BDC)
- Infrastructure Investment Funds
- Private Export Funding Corporation

Public Sources of Debt Finance
- U.S. Small Business Administration (SMA)
- Overseas Private Investment Corporation (OPIC)
- California Export Finance Office (CEFO)
- California Infrastructure and Economic Development Bank (I-Bank)

Agencies that provide funds to both Californian and Mexican companies

- Export-Import Bank of the United States
- NADBank
- EPA

Finance possibilities for Mexican companies and municipalities

Private Sources of Debt Finance
- Commercial Banks

Public Sources of Debt Finance
- Fondo de Inversion en Infraestructura (FINFRA), part of the national development bank BANOBRAS
- Nacional Financiera (FINFRA)
- Fundación Mexicana para la Innovación y Transferencia Tecnológica (FUNTEC)
- CleanTech Fund
- Municipal Bond Issuing

Loans from Multilateral Development Banks
- World Bank
- Inter-American Development Bank (IADB)
- Japan Bank for International Cooperation (JBIC)

Bond and Equity Capital
- Municipal Bonds
- State Bonds
- Equity Capital

Private Sources of Credit Finance[6]

Commercial Banks

Basics: Banks loan money for specific time periods. The borrower repays the loan in monthly installments covering a portion of the principal loaned, plus an interest charge reflecting the bank's expenses and the risks assumed in making the loan. Commercial banks are the most common providers of trade finance and commercial lending. Commercial bank repayment terms (also called loan tenors) range from several months to several years. Commercial banks, individually or in syndicated loan arrangements, are also a major source of project finance. Commercial banks may also participate in project finance lending under export credit agency guarantees in risky countries or when extended repayment terms are involved.

Terms: Banks offer secured and unsecured loans. For a secured loan, the borrower puts up collateral in case of default. An unsecured loan carries a higher interest charge based on the credit of the borrower. A line of credit is an open account on which the borrower may draw up to the limit.

Eligibility: Because banks provide loans, not equity, they are more interested in a firm's cash flow than in the value of its underlying assets. Most established businesses with good credit histories and an ability to show profit can get bank financing. Start-ups, with the exception of franchises, have a more difficult time.

Environmental/export focus: If local bank seems reluctant to lend money to new export efforts, try the U.S. Department of Commerce, which maintains information on public and private finance institutions that offer trade finance.

For more information:
U.S. Department of Commerce
International Trade Administration
Office of Finance.
Tel: (202) 482–3050.
On the web: http://www.ita.doc.gov

In San Diego:
U.S. Department of Commerce
Julia Rauner Guerrero
Commercial Officer
6363 Greenwich Drive, Suite 230
San Diego, CA 92122
Tel.: (619) 557–2963
Fax: (619) 557–6176
E-mail: julia.rauner.guerrero@mail.doc.gov.

Business Development Corporations

Basics: Business development corporations (BDCs) are licensed by states to make loans to small businesses to support job creation. They are generally

owned and funded by financial institutions or corporations interested in business in a vigorous local economy. Beyond standard loans, BDCs can also make SBA-guaranteed loans and provide purchase/leasebacks and venture capital.

Terms: BDCs can usually make loans 90 percent guaranteed by the SBA.

Eligibility*:* BDC assistance is available exclusively to small businesses.

Environmental/export focus*:* BDC-type funding could be used to support small environmental firms or as a source of growth capital for start-ups in the environmental sector. It is more appropriate as a source of growth capital than as a source of export financing.

For more information:

Association of Small Business Development Centers
3108 Columbia Pike # 300
Arlington, VA 22204.
Tel: (703) 271–8700.
On the web: http://www.asbdc.net
For information on Development Centers in your area go to:
http://www.smallbusinesslearning.com

In San Diego:

Southwestern College
Small Business and International Trade Center
900 Otay Lakes Road, Building 1600
Chula Vista, CA 91910
Tel.: (619) 482–6391
On the web: http://www.sbditc.org

Infrastructure Investment Funds

Basics: Such funds are investing ever greater amounts in developing countries, where yields are expected to exceed 20 percent annually in some cases, which is much more than yields from mature infrastructure projects in industrialized economies. Most investors in such funds are institutional, with large pools of capital seeking high, but secure, returns. Funds are channeled to sponsors, whether public or private, of infrastructure projects, often in developing countries.

Terms*:* As variable as the funds themselves.

Eligibility*:* Infrastructure funds often invest in the securities of infrastructure entities through private placements. Infrastructure investment funds can be a group of investors or may be project cosponsors involved in structuring deals and mobilizing further capital.

Environmental/export focus: Examples of such funds are found throughout this chapter.

Private Export Funding Corporation

Basics*:* The Private Export Funding Corporation (PEFCO) is a consortium of private lenders that supplements conventional export financing sources. PEFCO works in concert with the Export-Import (Ex-Im) Bank of the United

States, and all PEFCO loans are required to be covered by either an Ex-Im Bank's guarantee or insurance policy or by a guarantee issued by the U.S. Small Business Administration (SBA). PEFCO lends money to foreign buyers making large-scale purchases, usually of capital equipment, when the amounts are larger or the repayment periods longer than traditional lenders can offer.

Terms: Loans (short, medium, and long term) range from $1 to $225 million for 5- to 22-year terms and are sponsored by domestic and foreign banks. Fees and rates reflect the market.

Eligibility: Loan requests must come from a commercial bank.

For more information: *Private Export Funding Corporation*
280 Park Avenue Tel: (212) 916–0300
New York, NY 10017 On the web: http://www.pefco.com

Public Sources of Debt Financing

Loans

Basics: Many sources of debt financing are available from the U.S. Government for the export of goods and services, as well as environmental investment projects abroad. This section briefly outlines U.S. Government-backed lending. In the United States, the major players in public-sector lending are the U.S. Small Business Administration (SBA), the Overseas Private Investment Corporation (OPIC), and the Ex-Im Bank.

U.S. Small Business Administration[7]

Basics: The SBA has one loan program of interest to small or start-up companies. It can include loans for funding increases in export sales to loans for establishing an overseas presence.

Terms: The Export Working Capital Program (EWCP) guarantees short-term loans up to $1,111,111 for a maximum guarantee of 90 percent ($1,000,000 for product/service export purposes, extendible to preshipment working capital and post shipment exposure), including labor and materials for manufacturing, raw material purchases, or foreign accounts receivable.

The Regular 7(a) Loan Program guarantees loans up to $2,000,000 for a maximum guarantee of up to 50 percent ($1,000,000); the interest rate caps at 2.75 points above the New York prime rate for loans of up to seven years. The International Trade Loan Program offers long-term fixed-asset financing to help small firms compete globally. Guarantees are up to a loan amount of $1.25

million, maturities can be as long as 25 years, and the collateral must be located in the United States. The interest rate is 2.25 percent.

***Eligibility**:* Only small businesses that are independently owned and operated, not dominant in their field, and falling in specific employee and annual sales ranges (depending on the industry) are eligible.

For more information: *United States Small Business Administration*
Office of International Trade
409 3rd Street, SW, 6th Floor
Washington, D.C. 20416.

For regional Small Business Development Centers, which provide business assistance including export and trade counseling/referrals, call 1–800–8–ASK SBA (1–800–827–5722). See the Insider's Guide to Small Business Loans, by former SBA official Dan Koehler, Oasis, 1–800–228–2275, 1996. On the Web: http://www.sba.gov

Overseas Private Investment Corporation[8]

Basics: OPIC supports U.S. business investment in developing countries. Programs include loans, insurance, and guarantees with a firm to analyze and structure financing for an overseas environmental project. It should be noted that OPIC supports overseas investment rather than exports, which are the Ex-Im Bank's focus.

Terms: Direct loans are available to small business, generally for $2 to $10 million with a repayment range of three to seven years. OPIC can provide loans of up to $30 million. For investment insurance, OPIC can insure up to $200 million per project, covering 90 percent of the political risks. For investment finance (project loans and guarantees), OPIC guarantees range up to $250 million and cover 100 percent of the commercial and political risks. The repayment range is three to 15 years. Interest rates on investment finance are market based.

Eligibility: OPIC does not provide export financing. Projects must have a positive effect on U.S. employment, be financially sound, have significant developmental benefits, and meet worker rights and environmental criteria. OPIC will give special consideration to projects in less-developed countries and those involving small U.S. firms as sponsors.

Environmental/export focus: OPIC has established the Environmental Enterprises Development Initiative to spur investment by U.S. environmental firms in Asia. OPIC also supports the Aqua International Partners Environmental Fund.

For more information: *Overseas Private Investment Corporation*
1100 New York Avenue, NW
Washington, D.C. 20527.
Tel: (202) 336–8400.
On the Web: http://www.opic.gov

California Export Finance Office (CEFO)

Basics: CEFO provides loan guarantees and helps companies that are based in California arrange working capital in order to export California goods and services to foreign countries. CEFO evaluates company eligibility for the program and then acts as a guarantor or advocate between company and the bank. CEFO has over 100 participating financial institutions throughout California.

Terms*:* CEFO offers three different types of guarantees: a pre-shipment working capital guarantee; a post-shipment accounts receivable guarantee; and a combination guarantee. All three guarantee a maximum of 90% of a loan. The maximum principal that CEFO will guarantee is $750,000, but CEFO can work with federal institutions such as the Small Business Administration and the Ex-Im Bank of the United States in order to guarantee a higher sum of working capital if needed.

Eligibility*:* Exporters who receive guarantees through CEFO must be domiciled in California and must be able to present proof of filing California state tax returns. Borrowers must possess at least one year of successful sales history with continuing sales growth and improving or stable profits. All exporters must have a positive net worth and sufficient cash flow to meet expenses for at least one quarter beyond the term of the guarantee. Products must have a California content greater than 50 percent of the total F.O.B. carrier value. Transactions must result in net economic benefit to the State of California by creating jobs and generating export sales.

For more information*:*

California Export Finance Office
California Technology, Trade, and Commerce Agency
1102 Q Street, Suite 6000
Sacramento, CA 95814
Tel: (916) 324–5511
Fax: (916) 324–5791

California Infrastructure and Economic Development Bank (I-Bank)

Basics: The California Infrastructure and Economic Development Bank (I-Bank) administers two finance programs for Californians. The **Infrastructure State Revolving Fund (ISRF) program** provides low-cost financing and technical assistance for public infrastructure investments made by municipal organizations. The **Bond Financing Program (BFP)** provides low-cost, tax-exempt bonds for manufacturing companies, nonprofit corporations, and public agencies.

***Terms**:* Financing through the ISRF program is available for loans between $250,000 to $10 million per project. Jurisdictions may not exceed a total of $20 million from this program. Loans are available for periods up to 30 years, but may not exceed the useful life of the project. The interest rate is fixed at 67% of an A-rated bond rate. To participate in the program, borrowers must pay a loan origination fee of 0.85% of the principal and a servicing fee of 0.30% of the principal. The BFP provides industrial development bonds that are conduit revenue bonds issued by a governmental agency but based on the terms of a loan. Neither the State of California nor the I-Bank is responsible for paying the bond. The program provides a maximum of $10 million for facilities and/or equipment to be used in manufacturing or processing at annualized costs that are 2-4% lower than other financing. Funds may also be used for construction and take-out financing.

***Eligibility**:* Eligible applicants for the ISRF include: cities, counties, special districts, redevelopment agencies, and assessment districts. Applicants must be able to repay the loan via the following sources: general fund revenues, enterprise fund revenues, tax increment revenues, assessment revenues, or other recurring revenues approved by the I-Bank. To be financed through the BFP, a project must create jobs or have another defined public benefit.

***For more information**:*

California Infrastructure and Economic Development Bank (I-Bank)
1102 Q Street, Suite 6000
Sacramento, CA 95814
Tel: (916) 322–1389
Fax: (916) 322-6314
On the Web: http://www.ibank.ca.gov

Agencies that Provide Funds to Both Californian and Mexican Companies

Export-Import Bank of the United States[9]

Basics: The Ex-Im Bank's mission is to support the U.S. private sector by financing exports. Its focus is on transactions the private sector cannot support alone. Although the Ex-Im Bank provides mostly guarantees and insurance, it does support some direct loan programs.

***Terms**:* *Medium- and long-term loans:* The foreign buyer/borrower can qualify for financing up to the lesser of 85 percent of the value of the U.S. content of the export transaction. Typical repayment terms range between five and 10 years, depending on the export value, the product or project being financed, the importing country, and the term offered by officially supported competitors.

Generally, relatively rich countries are expected to repay in the space of five years while repayment terms for relatively poor countries can be extended to up to 10 years. The borrower must make a 15 percent cash payment, not financed by the Ex-Im Bank, to the exporter. Smaller, short-term transactions can be financed through Ex-Im's export credit insurance.

Tied-aid capital projects fund: Evidence of foreign, officially supported export credits on concessional terms is required to enable Ex-Im to match the terms, structured as low-rate loans for 100 percent of export value. However, Ex-Im matches only cases that are confirmed matches of a foreign offer and that meet its tied aid guidelines. Tied aid usually involves maturities longer than 20 years, interest rates equal to one-half to two-thirds of the market rate in the currency of denomination, or large grants (equal to more than 35 percent of contract value) offered in conjunction with regular export credits.

Ex-Im offers direct loans and guaranteed loans for project finance for large capital equipment and service contracts where repayment depends on future project-revenue streams. Fees and interest rates for all programs are risk based.

Working capital guarantee program: This program encourages commercial lenders to make loans to U.S. businesses for various export-related activities. These might include the purchase of finished products for export, the purchase of raw materials and labor, the costs to cover up bonds, letters of credit, warranties and so on. The program is aimed at small- and medium-sized businesses that have exporting potential but lack the necessary funds to purchase or export products or services. The Ex-Im Bank working capital guarantee covers 90 percent of the loan's principal and accrued interests. Guaranteed loans must be collateralized. The Ex-Im Bank imposes no interest rate ceilings or maximum fee limitations, however, the lender should take into account that 90 percent of the risk is covered by an agency of the U.S. Government and price their loans accordingly.

Eligibility: Only foreign buyers (including foreign government entities) can receive direct or guaranteed loans to purchase U.S. goods and services. U.S. small- and medium- sized businesses can apply for the working capital guarantee program. Overall, small businesses (fewer than 500 employees) and environmental exporters receive priority.

Environmental/export focus: The Ex-Im Bank has an Environmental Exports Program that generated $394 million worth of exports of environmentally beneficial U.S. goods and services. It also provided $68 million in working capital guarantees to U.S. businesses. The program features greater support for financing of environmental sector goods and services, including local cost

coverage of 15 percent, capitalization of interest during construction, and the longest permissible repayment terms under the rules of Organization for Economic Cooperation and Development (OECD).

For more information: *Export-Import Bank of the United States*
Business Development
811 Vermont Avenue, NW
Washington, D.C. 20571.
Tel: 1–800–565–EXIM or (202) 565–3946.
On the web: http://www.exim.gov

North American Development Bank (NADBank)[10]

Basics: The North American Development Bank (NADBank) and its sister institution, the Border Environment Cooperation Commission (BECC), were created under the auspices of the North American Free Trade Agreement (NAFTA). The NADBank operates under the 1993 *Agreement Between the Government of the United States of America and the Government of the United Mexican States Concerning the Establishment of a Border Environment Cooperation Commission and a North American Development Bank.* The NADBank is a bilaterally funded, international organization in which the United States and Mexico are equal partners. It was established for the purpose of financing environmental infrastructure projects in a one hundred-kilometer corridor on each side of the U.S.-Mexican border. Its main functions are the promotion of public and private capital investment in BECC projects, the supplementation of such investment with NADBank loans and guarantees, and providing technical assistance to finance BECC projects. All NADBank projects must be certified by the BECC before they are eligible for funding; be related to potable water supply, wastewater treatment, or municipal solid waste management; and be located in the border region. Recently, the project areas to which NADBank can loan have been expanded to include those in air quality control, transportation, watershed conservation and management, clean and efficient energy, industrial and hazardous waste, and soil remediation. The authorized capital of the NADBank totals $3 billion, with equal payments from the United States and Mexico. Fifteen percent of the banks' capital is paid-in capital (liquid capital), while the rest of the funds are callable capital, meaning it can be provided by the two member countries as needed.

The NADBank operates a number of financing programs, the most important being the Loans and Guarantee Program, the Border Environmental Infrastructure Fund (BEIF) the Solid Waste Planning and Design Program (SWPD) and the Solid Waste Environmental Program (SWEP). Both the SWPD

and the SWEP programs were explained in the chapter on solid waste in this report.

The Loans and Guarantee Program is intended to fill those financing gaps where private-sector funding is not available. It can provide or guarantee loans to both private and public sector borrowers in the United States and Mexico under varying terms. Direct loans, interim financing, participation in municipal bond issues, and partial loan guarantees are possible.

The BEIF provides funding for projects in the poorest communities along the border. It receives and administers grants from other institutions, such as the EPA, which can then be combined with loans and guarantees to facilitate project financing through reducing the effective interest rate.

Terms: All three require BECC certification of all projects. Under the Loans and Guarantees Program, the NADBank cannot accept exposure of more than 50 percent of the total capital cost of the projects. Maturities range up to 25 years and grace periods are sometimes granted. Project cash flows and assets may be used as a loan collateral. Interest rates are market based and fees vary.

Eligibility: Under the Loans and Guarantees Program, all infrastructure projects on both sides of the border related to potable water, water pollution, wastewater treatment, municipal solid waste, and similar areas are eligible, but must be BECC certified. The BEIF only funds and administers municipal projects dealing with water and wastewater infrastructure. The projects must show benefits on the U.S. side of the border.

For more information:

North American Development Bank
203 S. St. Mary's, Suite 400
San Antonio, TX 78205.
Tel: (210) 231–8000 Fax: (210) 231–6232.
On the web: http://www.nadbank.org

Border Environment Cooperation Commission
Blvd.Tomas Fernandez, No.8069 Fracc. Parques
C.P.32470 Cd. Juárez, Chihuahua,
México
Tel: (011–52–16) 25–91–60
Fax: (011–52–16) 25–61–80
On the web: http://www.cocef.org

U.S. Environmental Protection Agency (EPA)[11]

Basics: The EPA's responsibility as a U.S. government agency is to protect human health and safeguard the natural environment. The agency works with both the industrial sector and all levels of government in a variety of voluntary

pollution prevention programs and energy conservation efforts throughout the United States. Over the next 7 to 10 years, the U.S. government plans to funnel nearly $700 million in construction grants through the EPA for infrastructure projects along the border. EPA grants will be used to develop projects for certification and to supplement funding for projects that cannot be completely financed by the NADBank, state or governments, or the private sector. As a member of both BECC and the NADBank, EPA tries to ensure that all of its funds are used only for high quality projects.

Terms: U.S. government grant terms apply.

Eligibility: Drinking water and wastewater treatment infrastructure projects in Mexican-U.S. border region are most eligible for EPA grants. All projects must be certified by the BECC.

For more information:

EPA Regional Office for California:
U.S. EPA Region 9
75 Hawthorne Street
San Francisco, CA 94105
On the web: http://www.epa.gov

Finance Possibilities for Mexican Companies

Private Sources of Credit Financing

Commercial Banks[12]

Basics: Numerous commercial banks in Mexico offer credit lines and loans to small and medium sized Mexican companies. Terms are from six months to seven years with varying interest rates depending on the credit line or loan granted. For more information on commercial banks, please see section one of this chapter.

For more information: *BANCOMEXT*
Centro Bancomext Tijuana
Blvd. Gral. Abelardo C. Rdgz. No.1405, Esq. con Frida Kahlo
Zona del Río
22320 Tijuana
Baja California, México
Tel.: (011–52–664) 634–2642
Fax: (011–52–664) 634–7694
On the web: http://www.bancomext.com

Banco Santander, Banco Bital, and Banorte all have numerous branch offices in Baja California and Baja California Sur. Their branch offices can be accessed through their web pages.

BANCO SANTANDER	BANCO BITAL	BANORTE
www.santander.com.mx	www.bital.com.mx	www.gfnorte.com.mx

Public Sources of Debt Financing

Fondo de Inversión en Infraestructura[13]

Basics: Fondo de Inversion en Infraestructura (FINFRA), the Mexican government's infrastructure fund, is part of Mexico's national development bank, BANOBRAS. FINFRA's goal is to encourage private-sector participation in basic infrastructure projects with high social returns where financial returns may be below market rates or where financing is difficult to obtain because of size, maturity, or risk.

Terms: FINFRA's equity participation is limited to 35 percent and it expects the same financial return that private-sector partners would. FINFRA also offers long-term subordinated debt at costs up to 40 percent of total project investment. FINFRA's combined involvement cannot exceed 49 percent of total project investment.

Eligibility: Water supply and water treatment are favored sectors for FINFRA. Any combination of public and private entities may apply to BANOBRAS. Preference is given to Mexican-led projects.

Environmental/export focus: FINFRA has a strong focus on environmental infrastructure and is thus considered an important source of funds for purchases of exports in this sector.

For more information: *FINFRA office at BANOBRAS*
Tecoyotitlan 100, Esquina Francia; Colonia Florida
03010 México D.F.
Tel: (525) 723–6200.
On the web: http://www.banobras.gob.mx

Nacional Financiera, S.A.[14]

Basics: Nacional Financiera, S.A., (NAFINSA or NAFIN) is the Mexican private-sector development bank. It focuses on lending to small- and medium-sized industry.

Terms: Medium- and long-term loans are available at fixed and variable rates for up to 12-year terms with up to two-year grace periods.

Eligibility: Mexican companies, investors, and government authorities may borrow from NAFINSA to purchase a broad range of goods and services. U.S. firms would most likely access NAFINSA through a local Mexican partner or customer.

Environmental/export focus: The bank manages 32 trade finance credit lines funded by various governments and private entities to help small and medium enterprises finance imports. Between $5 million and $50 million is available from each of these credit lines each year. More active in the environmental area recently, NAFINSA has a $245 million loan program dedicated to water and energy conservation projects.

For more information: *Nacional Financiera, S.A.*
Insurgentes Sur 1971; Torre IV Col. Guadalupe Inn
CP Delegación Alvaro Obregón
01020 México, DF. México.
Tel: (01) (525) 325–6000
On the web: http://www.nafinsa.com

FUNTEC[15]

Basics: FUNTEC, the Mexican Foundation for Innovation and Technology Transfer in Small-and Medium-Sized Companies (*Fundación Mexicana para la Innovación y Transferencia de Tecnología en la Pequeña y Mediana Empresa*), was jointly created by the Mexican government and the Mexican industrial sector

to promote industrialization in Mexico. It aims specifically to benefit small-and medium-sized companies through technical assistance, development, and analysis of technical projects and through loans from their monetary funds. Although there are numerous funds, only one is actually of interest for this report. The Pollution Prevention Project Fund (Fondo para Proyectos de Prevención de la Contaminación–FIPREV) seeks to aid small-and medium-sized companies in the implementation of pollution control measurements. Funds are granted to programs that

a) Identify and develop potential pollution control measurements in small and medium sized companies and
b) Finance the implementation of certified and analyzed pollution control projects.

Terms: All loans are short-or medium-term loans. They can be granted in dollars or pesos and are covered for up to 80 percent of the project's costs. Companies receive preferential interest rates that are usually below current market rates. Repayment terms can range up to four years, depending on the project. Grace periods for repayment are sometimes granted.

Eligibility: Only small-and medium-sized companies that are based in Mexico can apply for loans. Financial stability must be proven to guarantee the repayment of the loan. Technical and administrative capacity to carry out the project is also required.

For more information:

FUNTEC
Manuel María Contreras No. 133–105
Col. Cuauhtémoc
06597, México, D. F.
México
Tel. 591–00–88, 591–00–91, 591–00–02,
Fax 592–68–82.
On the web: http://www.funtec.org

Ecoenergy's (EIC) CleanTech Fund[16]

Basics: Ecoenergy International Corporation, a U.S.-based company with offices in Boulder, Colorado, Washington, D.C., and Mexico City, provides energy solutions to companies throughout the world, although emphasis is strongly placed on projects in Mexico, Central, and South America. It is currently considered the leader in the area of carbon management services and was selected by the Interamerican Development Bank to develop and co manage a $35 million private equity fund. This fund will invest in small-and medium-sized Mexican companies that focus on energy efficiency and renewables, transportation efficiency, pollution prevention, and recycling. It hopes to fill the

financing gap that currently exists in the Mexican environmental sector due to growing demand for environmental technologies. The money will be loaned to approximately twenty companies and above average returns are expected. Total equity, debt, and grant facilities are estimated at $75 million.

Terms: No terms have been specifically described yet. For more information contact Ecoenergy directly.

Eligibility: Mexican small- and medium-sized companies are eligible for funding.

For more information:

EIC Boulder Headquarters
3825 Iris Avenue, Suite 350
Boulder, CO 80301
Tel: (303) 473–9007; Fax: (303) 473–9060
On the web: http://www.eic-co.com

Loans from Multilateral Development Banks[17]

Basics: The leading institution providing multilateral lending and technical assistance for less-developed countries is the World Bank group, which includes the International Bank for Reconstruction and Development (IBRD), the International Development Association (IDA), the International Finance Corporation (IFC), and the Multilateral Investment Guarantee Agency (MIGA). The IFC and MIGA are both described in more detail elsewhere in this report.

Regional multilateral development banks (MDBs) include the European Bank for Reconstruction and Development (EBRD), the Asian Development Bank (ADB), the Inter-American Development Bank (IDB), and the African Development Bank.

The MDBs provide loans and development assistance to their developing member countries. Loans to middle-income and creditworthy poorer countries are made at or near market rates, while in many cases, the poorest countries receive interest-free loans. To promote private-sector growth and development, each of the MDBs provides some form of debt and equity financing at market rates for commercial enterprises.

MDB financing is relevant to small or start-up environmental companies because there may be opportunities to provide goods or services to an MDB-funded project. To become familiar with the portfolio of MDB projects, follow up with the contacts provided below.

Terms: Repayment terms on IBRD loans to middle-income developing countries are generally between 15 and 20 years with a three to five-year grace period. Repayment terms on IDA loans to low-income developing countries are between 35 and 40 years, including a 10-year grace period. Host country

approval and sovereign guarantees are required. The projects are located in developing countries.

Eligibility: Public-sector loans are made exclusively to governments, while the IFC and the private-sector financing arms of other MDBs provide direct loans and equity financing for commercial ventures. MDBs provide many different types of financing, but concentrate on large-scale project support, as opposed to export finance. U.S. firms must compete for contracts on MDB-financed projects. MDB public-sector operations do not provide financing directly for U.S. exports.

Environmental/export focus: Environmental projects are a growing focus of MDBs work. To encourage environmental projects, extended grace periods are offered.

For more information: MDBs usually award project support through international competitive bidding processes. Announcements of project opportunities can be found in the following places:

- *Development Business*, a United Nations publication. Tel: (212) 963–1515.
- World Bank Public Information Center. Tel: (202) 458–5454.
- *The World Bank Monthly Operational Summary*. Tel: (202) 473–1155.
- The EBRD monthly *Procurement Opportunities*. Tel: (44 71) 338–6000.
- The IDB publishes *The IDB*, a monthly describing approved loans. Tel: (202) 623–1366.

In addition, each MDB maintains its own website with detailed information on upcoming projects. The International Trade Administration of the U.S. Department of Commerce maintains a counseling center on the MDBs and has commercial staff assigned to each of the development banks.

Multilateral Development Bank Operations (MDBO) maintains and manages all commercial activities with the MDBs. MDBO staff counsel U.S. firms on how to do business with the MDBs, help firms identify best prospects for their product or service, conduct an extensive outreach and education campaign, and provide advocacy support for U.S. firms competing on MDB-financed contracts.

Contact the MDBO at tel: (202) 482–3399; fax: (202) 273–0927.

World Bank[18]

Basics: Mexico is the third largest borrower from the World Bank and the Inter-American Development Bank in Latin America. Both institutions provide nearly $2.5 billion annually to Mexico for the implementation of major projects. One of the strategic areas targeted is the environment. Mexico receives credit to help control environmental deterioration and contamination of urban and rural areas.

There are two agencies in the World Bank group—the Multilateral Investment Guarantee Agency and the International Finance Corporation, that offer programs that are of interest to this report. In addition, the World Bank itself offers grants through its Institutional Grant Facility (IGF).

Multilateral Investment Guarantee Agency (MIGA)[19]

Basics: Part of the World Bank group, the Multilateral Investment Guarantee Agency (MIGA) offers long-term political risk insurance and advisory services. Types of foreign investments that can be covered include equity, shareholder loans, and shareholder loan guarantees, provided the loans have a maturity of three years. MIGA complements the activities of public and private insurance programs and the IFC. Working with member developing country governments, MIGA advises investors of new opportunities in those nations. Typical MIGA coverage includes war, revolution, or civil disturbance; breach of contract; currency transfer; and expropriation.

Terms*:* Investors may choose any combination from four types of coverage (Transfer Restriction, Expropriation, Breach of Contract and War and Civil Disturbance). Equity investments can be covered up to 90 percent and debt up to 95 percent, with coverages typically available for up to 15 years and, in some cases for up to 20 years. Premiums are determined on the basis of both country and project risk, with the effective price varying depending on the type of investment and industry sector.

Eligibility*:* The investment must be located in a member country and it must be new or associated with restructuring of an existing enterprise. Equity forms of direct investment qualify, as do technical contracts, franchising, and licensing agreements. Investments must contribute to host country development and meet local priorities. It is best to contact MIGA while still in the planning stage of a foreign venture.

For more information: *Multilateral Investment Guarantee Agency*
Tel: (202) 473–6165
On the Web: http://www.miga.org

International Finance Corporation[20]

Basics: The private-sector arm of the World Bank group, the IFC takes equity stakes in private sector companies and other entities such as financial

institutions, and portfolio and investment funds in developing countries. The IFC always acts as a minority partner with other investors.

Terms: *Equity financing:* To ensure the participation of other private investors, the corporation generally subscribes to between 5 percent and 15 percent of a project's equity. IFC is never the largest stakeholder in a project and will normally not hold more than a 35 percent stake. IFC's equity investments are based on project needs and anticipated returns. The Corporation does not take an active role in company management.

Loans: Loans are issued in leading currencies, but local currency loans can also be provided. The loans typically have maturities of seven to 12 years. Grace periods and repayment schedules are determined on a case-by-case basis in accordance with the borrower's cash flow needs. If warranted by the project, IFC provides longer-term loans and grace periods (extensions sometimes up to 20 years). Loans are usually limited to 25 percent of the total estimated project costs and, on an exceptional basis, 35 percent for small projects. The IFC also provides its clients with technical and advisory support, joining financing and investors, and arranging for syndication with banks. The IFC does not conduct feasibility studies. All projects supported must meet World Bank and local environmental policies.

Eligibility: Generally, loans range from US$1 million to US$100 million and are provided to World Bank member countries. A special program for small businesses (including environmental) provides loans as small as $1 million.

Environmental/export focus: Some IFC funds are environmentally specific, such as the Terra Capital fund for biodiversity and the Renewable Energy and Energy Efficiency Fund. In addition to investing in environmental projects, the IFC advises firms on how to attract foreign/local investment in environmental ventures; studies the role of the private sector in providing environmental goods and services to promote market opportunities; and participates in the Global Environment Facility through cofinancing of investment projects in the areas of biological diversity, global warming, water pollution, and depletion of the ozone layer, with particular emphasis on supporting environmental programs of small and medium enterprises.

For more information:

IFC's Environment Division
Room I–10–157
1818 H Street, NW
Washington, D.C. 20433.

Tel: (202) 473–7954
On the Web: www.ifc.org

World Bank's Institutional Grant Facility[21]

Basics: The World Bank's Institutional Grant Facility (IGF) is a $25 million-grant facility for technical assistance projects in upstream institutional development and capacity building. It works closely with the United Nations Development Program (UNDP), the Development Assistance Committee of the Organization for Economic Cooperation and Development (OECD), and other United Nations system agencies.

Terms: Up to $500,000, with priority to requests that are innovative or exploit a special opportunity.

For more information: *Procurement Service Division*
The World Bank, 1818 H Street, NW
Washington, D.C. 20433.
Tel: (202) 458–2912
Fax: (202) 477–3129.

Inter-American Development Bank (IADB)[22]

Basics: The IADB finances many private-sector projects through its Multilateral Investment Fund (MIF). The fund was established in 1993 to encourage private-sector development throughout Latin America and the Caribbean. Currently, the MIF is equipped with US$1.3 billion in funds that it uses for grants or other investment mechanisms. MIF's main objective has been to support small-scale projects that pilot new approaches and act as a catalyst for larger reforms. The IADB has developed a "project pipeline" where all proposed and on-going projects can be reviewed. It can be found on the web at: <http://www.iadb.org/exr/pipeline/cicle.htm>

Quite recently, the MIF introduced the use of "clusters" for promising development approaches. These clusters consist of a group of six to 10 projects in a particular thematic area that are developed, supported, and reviewed according to specific strategies presented to the MIF Donors Committee. One of these clusters, the "Achieving Ecoefficiency through Cleaner Production and Environmental Management Cluster," deals with helping small- and medium-sized businesses become more ecoefficient by eliminating and reducing the causes of pollution, waste generation, and resource consumption. The MIF is still seeking additional projects for this cluster. To find out more about requirements concerning potential projects, please go to the MIF homepage at: <http://www.iadb.org/mif/website/default.asp>.

Terms: MIF projects need to fulfill a number of criteria before they are eligible for funding. Projects should be innovative and show an effective new approach, offer the potential to be replicated in other sector and/or countries

(demonstration effect), present a credible plan and strong potential for financial sustainability (sustainability) and a local partner in the country carrying out the project (partnership). Projects can be eligible for grants but must present matching financing on part of the executing agency usually 30–50 percent of the total amount of the operation.

Projects in the "clusters" are also eligible for grants, but have to present counterpart financing and an adequate project proposal. Costs covered by the MIF may include all or part of the following general categories: consulting services; seminars/workshops; payment of trainers; material development; and licenses, software, and minor computing equipment.

For more information: *Multilateral Investment Fund (MIF)*
Inter-American Development Bank (IDB)
1300 New York Avenue, NW
Washington, D.C. 20577
Tel: (202) 623–1000
On the web: http://www.iadb.org

For more information concerning "clusters" please contact:
Mr. Daniel Shepherd
Operational Specialist
E-mail: daniels@iadb.org

Japan Bank for International Cooperation (JBIC)[23]

Basics: The JBIC, a Japanese multilateral investment bank, provides grants and loans to developing countries. Through its lending policies, it seeks to strengthen the development of the Japanese economy and to encourage economic and social development in developing countries. It does not seek to compete with commercial banks.

Aside from the provision of Untied Loans, there are also two other loan programs that are of interest to Mexico:

- The **Official Development Assistance (ODA) loan program** provides both bilateral and multilateral loans. Multilateral ODA consists of contributions and subscriptions to multilateral institutions such as the United Nations and others. Bilateral ODA can consist of bilateral loans and grants. Bilateral grants are divided into grant aid and technical cooperation grant aid is provided to very low-income countries. It can be used to support basic human needs (medical services, water supply and so on. and in some cases, infrastructure development) or to develop human resources. Through the Technical Cooperation program, the JBIC provides technical expertise to developing countries. ODA loans are soft loans with

low interest rates and long repayment terms. These loans provide funds to develop economic and social infrastructure. ODA loans can be project loans (to finance infrastructure projects), loans provided for engineering services, or financial intermediary loans (loans provided to the financial institutions of the recipient country for the implementation of new policies).

- Through the **Private-Sector Investment Finance program**, the JBIC channels loans to Japanese companies interested in investing in developing countries and to the partner company (or companies) in the project country. Loans are provided to the prospecting, agriculture, forestry, and fishery sectors, for preparatory surveys and pilot projects, and for infrastructure projects.

Terms/Eligibility: At the time that this report was written, no information could be accessed concerning terms and eligibility for loans. It can be assumed, however, that Mexico qualifies for both Untied aid and the two aforementioned programs. As of April 2002, the JBIC had already made nine ODA loan commitments to Mexico. One of these loans is also mentioned in the chapter on water pollution.

For more information: Japan Bank for International Cooperation (JBIC)
On the web: http://www.jbic.go.jp/english

Bond and Equity Capital[24]

Bonds

Core features: Bonds are the major form of long-term debt. A bond is a written promise to repay borrowed money at a fixed interest rate and a fixed schedule, usually over 15 to 30 years. Both private companies and governments issue bonds as a principal means of obtaining working capital for general growth or for specific projects.

Types: Bonds come in many forms. Most relevant for environmental firms are government bonds. These bonds, usually issued by cities as municipal bonds, are the principal way of financing environmental infrastructure projects in the United States. Almost always tax-exempt, government bonds carry lower rates of interest than comparable commercial bonds; they are the major source of low-interest capital for publicly financed projects. There are two major classes of government bonds. General obligation bonds are secured by and paid for out of tax revenues. Revenue bonds, the type most in use today, are secured by and paid for out of the revenue streams of a particular project supported by the bond issue.

Limitations: Bond issues tend to be for large amounts, in the $100 million range, so their usefulness for export financing is minimal. However, bond issues for infrastructure projects overseas may be a way for customers to obtain financing independently of the exporter. Government bonds often require voter approval and the total amount of money that can be raised through bond issues may be capped.

Equity Capital

Core features*:* Equity financing entails ceding exclusive control over a company by selling ownership interest in it to outside investors. Rather than borrowing money and adding to financial liability, equity financing creates no obligation to pay principal and interest as with a loan. Investors' returns come from their shares of the firm's profits, such as dividends or capital gains at sale. For small environmental businesses, equity may come from individuals, venture capital companies, or parent companies, as well as from the public sale of stock. Equity capital can be provided in-kind, via contributions of land or buildings, personnel, and even from the use of a larger company's name, technology, business plan, or markets. Equity financing is one of the most creative and flexible ways to support a business.

Types: The key equity tools available from the private sector for financing environmental exports and projects outside the United States are share sales (including public offerings, venture capital, private placements, "angels," and depository receipts), foreign direct investment, and strategic alliances. Very limited equity capital is available directly from public-sector institutions. Partnerships with multilateral development banks or small-business investment corporations often motivate further investment from private sources.

Limitations: By definition, an equity investor owns a piece of a company and early-stage businesses may feel a loss of ownership if equity holders assume controlling positions. Terms for equity financing vary widely depending on the type of share issue, and outside advisors (lawyers, accountants) can be expensive for a small business. The type and time frame of returns that equity contributors demand also vary, increasing the challenges of arranging for this type of funding.

References

[1] International Trade Administration (ITA), U.S. Department of Commerce. 1996. "Mexico Environmental Export Market Plan." Prepared by Sierra International, LLC. (Cited 28 August,

2001), http://web.ita.doc.gov/ete/eteinfo.nsf/vwQFbyCountry and Aguilar, José. 2002. Telephone interview by author. San Diego, California (10 April)
[2] Treviño, Tim. 2002. Interview by IRSC staff. NADBank, San Diego, California (March 2002).
[3] Morris, Kenn. 2002. "Mexican Municipal and State Bond Financing Update." San Diego. Unpublished.,
[4] Standard and Poor's. 2002. "Sovereign Ratings List." (Cited 31 January), http://www.standardandpoors.com/RatingsActions/RatingsLists/S…/SovereignsRatingsLists.htm.,
[5] International Trade Administration. 2001. "Financing Environmental Exports-A Guide to the Fundamentals and Sources." (Cited February 2002), http://web.ita.doc.gov/ete/eteinfo.nsf/finance,
[6] International Trade Administration 2001
[7] International Trade Administration 2001 and Small Business Administration (SBA). 2002. "SBA Loan Program." (Cited March), http://www.sba.gov/financing/indexloans.htm
[8] Overseas Private Investment Cooperation (OPIC). 2002. "Finance Department." (Cited March), http://www.opic.gov/finance
[9] International Trade Administration 2001 and Export Import Bank Bank (Ex-Im Bank). 2002. "Ex-Im Bank Programs." (Cited 4 February), http://www.exim.gov/mover.html.
[10] North American Development Bank (NADBank). 2002. "General Information. Projects and Services." (Cited February), http://www.nadbank.org
[11] Environmental Protection Agency (EPA). 2001. "BECC and NADBank: Promoting Environmental Infrstructure on the U.S.-Mexico Border." (Cited 21 November), http://www.epa./gov/oia/mex.2.htm
[12] Bancomext, Banco Bital, Banorte and Banco Santander. 2002. (Cited January). Websites: http://www.bancomext.com, http://www.bital.com.mx, http://www.gfnorte.com.mx and http://www.santander.com.mx
[13] and Banco Nacional de Obras y Servicios Públicos (BANOBRAS). 2002. "FINFRA." (Cited 23 January), http://www.banobras.gob.mx
[14] International Trade Administration 2001 and Nacional Financiera, S.A. (NAFINSA). 2002. (Cited 23 January), http://www.nafinsa.com
[15] Fundación Mexicana para la Innovación y Transferencia de Tecnología en la Pequeña y Mediana Empresa (FUNTEC). 2002. "Misión y Objetivos. Programas." (Cited 31 January), http://www.funtec.org
[16] Econenergy International Cooperation (EIC). 2002. "The CleanTech Fund." (Cited 31 January), http://www.eic-co.com/CleanTech.htm.
[17] International Trade Administration 2001
[18] International Trade Administration 2001
[19] Multilateral Investment Guarantee Agency (MIGA). 2002. "Overview of MIGA's Investment Guarantee Service." (Cited 8 February), http://www.miga.org and International Trade Administration 2001
[20] International Finance Cooperation (IFC). 2002. "Products and Services." (Cited 8 February), http://www.ifc.org/proserv/products/loans/loans.htm
[21] International Trade Administration 2001
[22] Inter-American Development Bank (IADB). 2002. (Cited 25 March), http://www.iadb.org
[23] Japanese Bank for International Cooperation (JBIC). 2002. (Cited 18 April), http://www.jbic.go.jp
[24] International Trade Administration 2001

Chapter X

Results and Recommendations

The previous nine chapters of this report indicated areas where environmental problems produce market opportunities for environmental technology and service (ETS) providers specializing in water transmission and purification, wastewater treatment, air quality, energy efficiency and renewable energy, industrial environmental management, solid and hazardous waste management, and agriculture. This chapter recounts some of the observations obtained from the data gathering process, the results of survey research, and the suggestions made by participants at a forum held in Tijuana on April 26, 2002. "Study participants" is used in this chapter to refer to people who provided input to this report through their comments on the survey forms or during interviews. These recommendations are aimed at California ETS providers, representatives of California state government, and individuals at Mexican agencies or companies. The recommendations deal primarily with finance, networking, and other export promotion issues.

Financing

Access to affordable finance options has been considered one of the major stumbling blocks to building environmental infrastructure in Mexico and to increasing exports of environmental technology and services from California suppliers to Mexican customers. Although a number of finance programs are available and identified in Chapter IX, opportunities for improvement remain.

California ETS Companies

Many California ETS companies indicated that they would require financial and payment guarantees/assurances as incentives for them to consider doing business in Mexico. A number of existing public finance programs—at the Small Business Association (SBA), Overseas Private Investment Corporation (OPIC),

Export-Import Bank (Eximbank), the California Export Finance Office (CEFO), and the North American Development Bank (NADBank)—provide such guarantees. For instance, CEFO provides loan guarantees for 90% of a loan and has terms designed for facilitating exports of small and mid-sized companies. However, CEFO statistics indicate that only 7% of the guarantees it issues are made for exports to Latin America, of which only a portion goes to Mexico.[1] In contrast, 54% of the guarantees are for exports to Asia and 24% for exports to Europe.[2] These results suggest that companies that could be obtaining guarantees for exports to Mexico are unfamiliar with the program or find some of the terms to be unattractive. More research needs to be done to determine why companies are not taking advantage of opportunities to export environmental products and services to the Baja California peninsula.

Recommendations for California ETS Companies:

1. Make financial agreements with customers according to current economic conditions (i.e., recession) and offer discounts on timely payments.
2. Invest time in learning about financing opportunities that could support company export growth. Contact local trade specialists at the U.S. Department of Commerce; California Trade, Technology, and Commerce Agency; Small Business Assistance Center; California-Mexico Trade Center; or other local organization for assistance.
3. At the forum, Mexican lawyer Daniel Gutiérrez presented information that conveyed the following recommendations:
    - Whenever possible, companies should sell to Mexican customers in terms that are Cash in Advance to minimize credit risk. Other less risky payment methods are letters of credit (sight drafts) or documents against payment or acceptance.
    - If selling using the Open Account payment method, companies should invest substantial due diligence to ensure that they receive payment. All paperwork should be reviewed by experts to make sure that it is legally binding and complete. Gutiérrez mentioned several cases where sellers depended on promissory notes

(Pagaré) to guarantee payment, but faulty wording of the note prevented sellers from collecting payment after the buyers' default. Credit insurance can help minimize losses.

- To avoid being charged permanent establishment taxes, transactional value-added taxes, customs valuation, non-tariff barrier compliance risks, companies should either sell and deliver product in the United States or enlist the services of a customs broker/freight forwarder/consignee.

California Agencies and Government

Over the past decade, the State of California has made great progress in improving cross-border relationships and collaboration. The continuation of pilot programs such as the vehicular inspection program and wastewater monitoring program is important, as is the exploration of other programs to strengthen ties in the region.

Recommendations for California Agencies and Government:

1. Efforts should be continued—and perhaps expanded—to engage in outreach to businesses that can benefit from California financial programs, such as the CEFO and I-Bank.
2. An entity in California should be designated to establish and maintain networks for disseminating information about financing and other trade support information. The Small Business Development and International Trade Center at Southwestern College in San Diego is ideally positioned to serve as this information clearinghouse both because of its proximity to the California-Mexican border and because of its affiliation with the California-Mexico Trade Assistance Center network in addition to others. This entity should receive funding (an annual allocation of approximately $200,000 would be appropriate) for coordinating inter-agency outreach programs.
3. The CEFO and I-Bank should include environmental technology and services as a classification for program evaluation. Currently, CEFO statistics do not specify environmental technology and services as a unique industry category. As a result, the environmental exports that are being made using CEFO guarantees are obscured in the categories of general manufacturing, high-tech, food and agriculture,

and services. This measurement would be useful in tracking growth in the California industry's influence in Mexico.

4. The I-Bank's mandate should include projects on both sides of the Californian-Mexican border, where investments in Baja California would improve environmental quality in California. Financial arrangements should stipulate that a certain percentage will come from producers in California.
5. Cal/BECC should be more active in tracking and disseminating changes in the BECC and NADBank and widely publicizing this information, working with Cal/EPA, the California Trade Technology and Commerce Agency, and other key agencies and organizations.
6. Cal/BECC could expand its mandate beyond environmental infrastructure and target NADBank for access to funds for applied research, training, and scientific research. For example, Cal/BECC could partner with the Imperial Valley Campus of San Diego State University in Calexico to develop capacity-building programs and conduct applied research on environmental health issues.
7. To provide incentives for Southern California companies and municipalities to invest in the Baja California peninsula, a program should be developed to give pollution credits at a 2:1 or similar ratio for those organizations that invest in projects in the border region that reduce pollution in and near California.

Mexican Government and other Mexican Customers

Study participants indicated the need for flexibility in financing to deal with economic crises when they occur. For example, the devaluations of 1976, 1982, and 1994-5 severely affected the ability of the Mexican government and customers to fulfill their debt obligations and follow through with planned projects. The Mexican market has yet to completely recover from the devaluation in 1994–1995.

Study participants would also like to see financing opportunities that are tied to environmental protection policies in Mexico. For example, the *Industria Limpia* program provided the incentive of regulatory relief for companies that successfully participated in the Mexican government's environmental auditing

program. Companies participating in the program were inspected less frequently for regulatory compliance. Enforcement actions provide an opportunity for companies and government agencies to finance cleaner technologies and infrastructure if polluters are able to purchase equipment that improves environmental quality in lieu of paying fines. For instance, enforcement of air emissions at the plant level provides the opportunity for the purchase of air filters and/or pollution prevention equipment to be made instead of payment of fines. Above all, study participants stressed the need to focus on long-term solutions despite short-term political pressures.

Recommendations for Mexican Government Agencies and other Mexican Customers:

1. The Mexican government should create incentives for companies to purchase environmental technology and services, thereby creating a market. Several options for incentives would be: regulatory relief, using fines at individual plants to finance the purchase of pollution prevention/control equipment and services, or permitting the purchase of pollution prevention equipment to be made in place of the payment of fines. Another possibility could be to create an incentive program to reduce inspection frequency if pollution control equipment is installed voluntarily. This program could be a joint program between California and Baja California in which Baja California officials provided regulatory relief if companies voluntarily purchased environmental technology and services from Californian companies.
2. Government should continue work to ensure the timeliness of communication and transparency of bidding processes. Some Mexican agencies have begun this effort. For instance, SEMARNAT has developed a web site to help companies track the progress of their permit applications. Another government web site is www.compranet.gob.mx, which increases the transparency of bidding procedures.
3. Mexican officials are advised to continue collaboration with agency counterparts in California to exchange information about best practices on each side of the border, facilitate the transfer of methods and/or technologies, as well as identify infrastructure and capacity-building

opportunities. Collaboration to develop water monitoring programs in the Tijuana River Watershed and vehicular inspection programs in Tijuana are examples of effective collaboration.

Networking and Cross-border Collaboration

With regard to networking, participants at the forum identified the need for increased dissemination of information and outreach. Many ETS companies lack awareness of the potential market in Mexico and are unable to make meaningful connections in Mexico. The California Trade Technology and Commerce Agency and the Small Business Development and International Trade Center can help California companies become more aware of opportunities and direct them to resources that can minimize cultural challenges. Although some companies struggle with the language barrier, a majority of those surveyed identified language and cultural familiarity as some of California's strongest assets in doing business in Mexico.

Recommendations for State of California and Government Agencies in Mexico:

1. The state of California should provide regular opportunities for networking with Mexican officials and companies that are potential customers and/or partners for California-based firms. For instance, the California Technology, Trade, and Commerce Agency can work with the Small Business Development and International Trade Center in Chula Vista, California to organize regular, periodic trade shows for California suppliers and Mexican customers.
2. Officials from the Cal/EPA, California Technology, Trade, and Commerce Agency, and government agencies in Mexico should exchange more information about their programs and individual responsibilities of individuals within agencies. Sharing this contact information will facilitate outreach and strengthen current communication channels. There is a need for more persistent dissemination of information about changes in Mexican environmental laws and regulations, personnel updates in Mexican agencies, and projects that create trade leads. Designation of one person by

Cal/BECC to coordinate the flow of information about Baja California, Baja California Sur, and California would increase the flow of information to California companies.

3. As part of a California-Mexico networking effort, officials from the states of California and Baja California should work together to develop a Transboundary Environmental Impact Assessment process whereby the neighboring party is notified of projects that could have a potentially harmful environmental impact to them. Transboundary environmental impact statements should be readily available to stakeholders on both sides of the border.
4. Other participants at the forum stressed the need for increased environmental education and involvement with schools. Mexican and Californian agencies can contribute to the development of curricula and outreach.
5. The Small Business Development and International Trade Center in Chula Vista could be supported to serve as a clearinghouse to provide information for environmental export opportunities to California companies and Mexican customers.

Recommendations for California ETS Companies and Mexican Customers:

1. California ETS companies should more fully explore and take advantage of export promotion resources available through the U.S. federal and California state governments. They should also provide feedback to trade counselors regarding opportunities for improving their programs.
2. Some study participants at the April 2002 forum recommended that Californian and Mexican companies become more involved in K-12 schools and networked with other companies through conferences of mutual interest that involve the community. Community outreach is especially important in consulting projects that have significant perceived environmental, health, and safety risks, such as the liquefied natural gas projects that are proposed for Baja California's coast.
3. It is also critical that companies familiarize themselves with business regulations in Baja California and Mexico. Companies that succeed in the Mexican market will find that the role of personal contacts, particularly in export and import are essential for the success of the

transaction. Networking is an important part of being proactive in the market.

Export Promotion

When asked whether they perceived the export of ETS products to Mexico to be increasing, decreasing, or remaining constant, most study participants indicated that they believed it to be increasing and a majority deemed the Mexican market important, extremely important, and even vital. Table 1 lists, in descending order, the perceived advantages and disadvantages of California companies exporting ETS products to Mexico, as identified by the companies and agencies that participated in the survey. Although most believed strongly in the quality of California's environmental technology products and services and believed their location was an asset, many also saw the operating costs for businesses in California as high and therefore an obstacle to exporting.

Table 1: Perceived Advantages and Disadvantages of California Suppliers Exporting Environmental Technology and Services to Mexico.

Advantages	Disadvantages
1. Location/Geographic Proximity 2. Culture/Language/Hispanic workforce 3. Cutting edge technology and services 4. NAFTA and support services 5. Infrastructure	1. High costs (land, labor, prices, services, etc.) 2. Strong dollar 3. Language/language barrier 4. Complexity of business requirements in California 5. Patent infringement and risk of piracy

Recommendations for State of California and Government Agencies in Mexico:

1. The State of California should collaborate with Mexican organizations to hold more supplier shows for industry in Baja California, which will provide a matchmaking opportunity for California suppliers and Baja California industry buyers.
2. The State of California should work with Baja California and Baja California Sur to create continuous information sharing and networking

programs for suppliers-industry-government. As part of this information sharing process, they should engage in more outreach to communicate changes made by PROFEPA and laws that govern other countries. This outreach could be coordinated by the Small Business Development and International Trade Center in San Diego.

3. The state of California should provide public outreach through different methods of communication, including workshops, web pages, flyers, and others. Agencies within the state should work together to reach audiences in Mexico. For instance, Cal/EPA maintains excellent relations with environmental officials in Baja California and Baja California Sur, which can be beneficial to the California Technology, Trade, and Commerce Agency. By working together, agencies within the California state government can provide a synergy that benefits California companies in a way that federal programs do not.
4. Export promotion efforts should target companies with different levels of experience (from novice to advanced). The state of California should work on programs that ease the company's concerns about collecting payment and should provide support in marketing and selling in Mexico.

Recommendations for California ETS Companies and Mexican Customers:

1. Companies need to get information out about their products and services. Networking with trade associations and chambers of commerce in Mexico would be beneficial.
2. California ETS companies should offer affordable solutions to Mexican environmental challenges rather than attempting to sell the most sophisticated technology available.

Final Observations

Despite a flurry of activity in environmental technology and service export promotion programs in Mexico during the early 1990s, attention has shifted away from the NAFTA region to Asia. Yet, environmental degradation continues in Mexico and particularly in the northern region of the Baja California peninsula, where population and economic growth outpaces city planning and infrastructure development. The strengthening of NAFTA institutions and increased cross-border cooperation provide a timely opportunity to address the environmental

challenges in the peninsula while also benefiting California's economy and the profitability of ETS providers in California. Investments in environmental technology and services for the Baja California peninsula provide multiple benefits for California residents. Not only can increased exports of California goods and services create jobs and improve the state economy, but these activities also improve environmental quality in Baja California, which is directly beneficial to California residents. Improvements in environmental quality south of the border contribute to improved quality of life on the north side of the border.

References

[1] California Technology, Trade and Commerce Agency. 2002. "California Export Finance Office Update. (Cited 29 July, 2002), http://www.commerce.ca.gov/ttca/pdfs/detail/int_trade/CEFOUpdate.pdf
[2] California Technology, Trade and Commerce Agency. 2002. "California Export Finance Office Update. (Cited 29 July, 2002), http://www.commerce.ca.gov/ttca/pdfs/detail/int_trade/CEFOUpdate.pdf